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Kansas Entomological Society
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SOME NEW SPECIES OF RHAGOVELIA (Hemiptera, Veliidae)

JOHN A. BACON*
Lawrence, Kansas.

During the course of a taxonomic study of the genus **Rhagovelia** Mayr under the direction of Dr. H. B. Hungerford several new species have been discovered among the recently collected material in the Francis Huntington Snow Entomological collections.

Rhagovelia bisignata n. sp.

(Fig. 1.)

Size: Length	Width
3.23 mm. apterous ♂	1.26 mm. apterous ♂
3.82 mm. apterous ♀	1.33 mm. apterous ♀
3.52 mm. winged ♂	1.46 mm. winged ♂
3.82 mm. winged ♀	1.40 mm. winged ♀

Color: General color brown-black, clothed with brown pubescence. Head with impressed median line well defined, with two or three spots on each side, the lateral converging lines not meeting at the base to form a perfect "V". Pronotum with broad transverse band of lighter gray on apical three-fourths and with median area orange. Venter gray. Base of antennae, the anterior coxae, posterior coxae, and the posterior trochanters pale yellow to brown-orange. Mesonotum of apterous forms with shining black triangle each side of median line with apex directed posteriorly. Margins of connexiva black. Apterous male with median area of venter of last segment and genital segments black; shining black spots on dorsum of last two or three abdominal segments. Apterous female with shining black spots on dorsum of last seven segments of the abdomen.

Structural Characteristics: Head, sides of body, two basal segments of antennae, and all legs with long hairs and a few scattered setae. Pronotum in apterous forms sutured off from mesonotum. **Apterous male:** anterior trochanters unarmed; anterior tibiae not dilate and moderately sinuate. Pronotum wider than long (L. 14, W. 70); mesonotum with width subequal to length (L. 70, W. 72) and nearly covering the median portion of metanotum. Proportions of antennae: Seg. I: II: III: IV: : 78: 48: 45: 38; of intermediate legs: Fem.: Tib.: Tars. II: Tars. III: : 170: 100: 65: 59; of posterior legs: 135: 144: 8: 24. Connexiva wide near base and tapering posteriorly, the angle of taper increasing about the sixth abdominal segment. Venter with slight median carina which becomes pronounced on last abdominal segment. Posterior trochanter unarmed. Posterior femur not incrassate (L. 135, W. 11), armed with one brown spine at apical two-sevenths and

*Contribution from the Department of Entomology, University of Kansas.

with two or three very small teeth from there to apex. Posterior tibia straight and unarmed, or armed only with a very small brown spur at apex. **Apterous female:** proportions of antennae: 75: 46: 47: 36; of intermediate legs: 165: 95: 63: 60; of posterior legs: 135: 144: 8: 24. Posterior femur armed as in male. **Winged forms:** proportions of legs and antennae, and armature of posterior femur as in apterous forms. Pronotum not produced into a spiniform process.

Data on Types: Holotype, apterous ♂; allotype, apterous ♀; holomorphotype, winged ♂; paratypes, 10 apterous ♂♂, 11 apterous ♀♀. Described from series from Tamazunchale, Mexico, S. L. P. 7-20-37, H. D. Thomas. Allomorphotype, winged ♀, from Guatemala El Salto, Escuintla, 1934, F. X. Williams. All type specimens are in the Francis Huntington Snow Entomological Collections.

Comparative Notes: This species is near **Rhagovelia regalis** D. & H from which it differs in the proportions of the legs and in the shape of the male clasper. It can be told from all other **Rhagovelia** by the nature of the markings of the mesonotum when these markings are distinct.

Data on Distribution:

Mexico: Tamazunchale S. L. P. 7-20-37, H. D. Thomas. (Type series). 11 apterous ♂♂, 1 winged ♂, 12 apterous ♀♀.
Acapulco Gro, July 12, 1937, H. D. Thomas. 1 apterous ♂, 4 apterous ♀♀, 4 nymphs.
El Sabino Uruapan Mich Mex., 7-24-36, H. D. Thomas. 32 apterous ♂♂, 28 apterous ♀♀.

Guatemala: El Salto Escuintla, 1934, F. X. Williams. 9 apterous ♂♂, 2 winged ♂♂, 19 apterous ♀♀, 5 winged ♀♀ (includes allomorphotype).
Trib Rio Negro, N. Salama, 4-22-47, M 47 47, R. R. Miller. 1 apterous ♀.

Costa Rica: San Jose C. A. 6 &7, 1931, Heinrich Schmidt. 4 apterous ♂♂, 4 apterous ♀♀.

Rhagovelia deminuta n. sp.

(Fig. 8)

Size:	Length	Width
	2.42 mm. apterous ♂	0.97 mm. apterous ♂
	2.80 mm. apterous ♀	1.03 mm. apterous ♀

Color: General color gray-black, clothed with gold-brown pubescence. Pronotum orange with gray spots at each lateral margin. Venter gray. Base of antennae, base of anterior femora, all coxae and trochanters yellow. Posterior femora with distal and apical quarters yellow to tan and middle half of femora brown. Venter of last abdominal segment and genital segment brown to orange-brown. Margins of connexiva orange.

Structural Characteristics: Fusiform. Pronotum sutured off from mesonotum in apterous form. **Apterous male:** anterior trochanters unarmed; anterior tibiae slightly dilate and flattened on the ventral surface. Pronotum

wider than long (L. 8, W. 48); mesonotum truncate (L. 42, W. 57) and nearly covering the median portion of metanotum. Proportions of antennae: Seg. I: II: III: IV:: 43: 22: 28: 32; of intermediate legs: Fem.: Tib.: Tars. II: Tars. III:: 100: 75: 38: 43; of posterior legs: 75: 75: 2: 16. Abdomen tapering evenly to apex. Abdomen without ventral carina. Posterior trochanter unarmed. Posterior femur moderately incrassate (L. 75, W. 20) and armed with one long, yellow, brown-tipped spine at the middle and from there to the apex with six or seven decreasing spines. Posterior tibia not sinuate and armed on the basal half with a few very short teeth; armed at apex with a small spur. **Apterous female:** proportions very similar to the male. Proportions of antennae: 45: 22: 28: 31; of intermediate legs: 100: 75: 40: 46; of posterior legs: 80: 80: 2: 19. Posterior femur not quite so incrassate as in the male (L. 80, W. 20); armed as in the male. Posterior tibia armed as in the male. **Winged forms:** unknown.

Data on Types: Holotype, apterous ♂; allotype, apterous ♀; paratypes, 87 apterous ♂♂ and 49 apterous ♀♀. Described from specimens labeled: "British Guiana, Supuruni Creek, August 12, 1937, S. Harris." All type specimens are in the Francis Huntington Snow Entomological Collections.

Comparative Notes: This species is most nearly related to **Rhagovelia spinosa** Gould but does not have the ventral abdominal spine which characterizes **R. spinosa.** It can be told at a glance by the light colored area at the apical quarter of the posterior femur.

Data on Distribution:

British Guiana: Supuruni Creek, August 12, 1937, S. Harris. (Type series). 88 ♂♂, 50 ♀♀.

Rhagovelia evidis n. sp.

(Fig. 6)

Size:	Length	Width
	2.50 mm. apterous ♂	1.03 mm. apterous ♂
	2.93 mm. apterous ♀	1.13 mm. apterous ♀

Color: General color black, clothed with a very fine brown pubescence. Head with usual impressed lines. Pronotum gray with a faint orange band at middle. Venter blue-gray. Base of antennae, base of anterior and very small portion of base of posterior femora, all coxae and trochanters yellow. The posterior and intermediate tibiae and all tarsal segments brown. Margins of connexiva black. Apterous male with shining black spot on dorsum of last abdominal segment; venter of last abdominal segment black with a small blue-gray triangle with base on the anterior margin of the segment. Apterous female with shining black spot on dorsum of last two abdominal segments.

Structural Characteristics: Fusiform. Widest through mesothorax. Usual long hairs and setae present. Pronotum sutured off from mesonotum in apterous forms. **Apterous male:** anterior trochanters armed only with a small tuft of dark brown hair; anterior tibiae not dilate, only very slightly flattened on the ventral surface. Pronotum wider than long (L. 12, W. 59);

mesonotum truncate (L. 47, W. 60) and nearly covering the median portion of metanotum. Proportions of antennae: Seg. I: II: III: IV:: 50: 27: 30: 29; of intermediate legs: Fem.: Tib.: Tars. II: Tars. III:: 106: 73: 40: 48; of posterior legs: 83: 83: 6: 16. Abdomen tapering evenly to apex. Venter of last abdominal segment with a slight carina extending only on the apical half with the segment slightly depressed to each side. Posterior trochanter unarmed. Posterior femur slightly incrassate (L. 83, W. 17) and armed with a long, black spine at the middle, followed by six or seven rapidly decreasing spines from there to apex. Posterior tibia straight and armed only with a small spur at the apex. **Apterous female:** proportions of antennae: 50: 27: 32: 29; of intermediate legs: 110: 75: 40: 48; of posterior legs: 83: 90: 6: 18. Connexiva slightly reflexed over last three abdominal segments. No ventral carina. Posterior trochanter unarmed. Posterior femur less incrassate than in male (L. 83, W. 15); armed slightly beyond the middle with a slender spine and from there to apex with approximately four decreasing spines. Posterior tibia straight and unarmed. Dorsum of first two abdominal segments arched above; third to sixth depressed so as to form a shallow trough. **Winged forms:** unknown.

Data on Types: Holotype, apterous ♂; allotype, apterous ♀; paratypes, 5 apterous ♂♂ and 8 apterous ♀♀. Described from secimens labeled: "Brazil, S. A., 9-25, 10-17-36, A. M. Ollala Vic. Santo Antonio, River Eiru, No. 3712." All type specimens are in the Francis Huntington Snow Entomological Collections.

Comparative Notes: This species is near **Rhagovelia tantilla** D. & H. from which it can be separated by its smaller size, the spur on the posterior tibia, the color of the intermediate trochanters, the structure of the last ventral abdominal segment of the male and the shape of the male clasper which is more pointed than that of **R. tantilla.**

Data on Distribution:

Brazil, S. A.: Vic Santo Antonio, River Eiru, 9-25, 10-17-36. A. M. Olalla. (Type series). 6 apterous ♂♂, 9 apterous ♀♀.

Rhagovelia fontanalis n. sp.

(Fig. 2)

Size: Length	Width
3.45 mm. apterous ♂	1.13 mm. apterous ♂
3.86 mm. apterous ♀	1.26 mm. apterous ♀
4.33 mm. winged ♂	1.39 mm. winged ♂
4.45 mm. winged ♀	1.46 mm. winged ♀

Color: General color dark brown, clothed with fine brown pubescence. Head with usual impressed lines. Pronotum gray with median area orange; posterior third of pronotum same color as mesonotum. Margins of connexiva black. Venter blue-gray. Basal half of first segment of antennae, all acetabulae, coxae, anterior and posterior trochanters, basal half of anterior femora, basal half of intermediate trochanter, and basal fifth of posterior femora yellow to yellow-brown. Broad, shining black spots occupying

nearly the whole dorsum of abdominal segments on all but first segment; the markings of the first segment usually smaller than that of the remaining segments, or may be absent. The last abdominal segment and genital segments of male orange; of female brown to black.

Structural Characteristics: Fusiform. Usual long hairs and setae present. Pronotum sutured off from mesonotum in apterous forms. **Apterous male:** anterior trochanters unarmed. Anterior tibiae slightly dilate and excavate on the apical fifth. Pronotum much wider than long (L. 15, W. 65); mesonotum also wider than long (L. 55, W. 67) and nearly covering the metanotum. Proportions of antennae: Seg. I: II: III: IV:: 60: 34: 40: 36; of intermediate legs: Fem.: Tib.: Tars. II: Tars. III:: 123: 87: 41: 50; of posterior legs: 105: 110: 11: 22. Abdomen tapering to apex, angle of taper increasing for last three segments. Venter without median carina. Posterior trochanter unarmed. Posterior femur very slightly incrassate (L. 105, W. 16), no wider than the base of the intermediate leg; armed with one curved spine at the middle, followed with four or five very short spines to the apex. Posterior tibia straight and unarmed. **Apterous female:** proportions of antennae: 63: 34: 39: 37; of intermediate legs: 134: 93: 45: 54; of posterior legs: 108: 115: 12: 23. Posterior femur very slightly incrassate; armed slightly beyond the middle with one short spine, and from there to apex with five or six very short spines, or may be armed only with the spine slightly beyond the middle, or unarmed. Posterior tibia straight and without a spur at the apex. **Winged forms:** proportions of legs and antennae, and armature of posterior femora the same as for the apterous forms. Tips of wings extend well over the apex of the abdomen. Pronotum not produced into an elongate process.

Data on Types: Holotype, apterous ♂; allotype, apterous ♀; holomorphotype, winged ♂; allomorphotype, winged ♀; paratypes, 6 apterous ♂♂, 12 apterous ♀♀; paramorphotypes, 7 winged ♂♂, 5 winged ♀♀. Described from series labeled: "Peru, S. A., Oct. 10, 1935, F. Woytkowski, Field note 3562, Vic Sani Beni, 840 m. a. s. l. Canal supplying drinking water." All type specimens are in the Francis Huntington Snow Entomological Collections.

Comparative Notes: This species is close to **Rhagovelia evidis** n. sp. from which is can be separated by its proportions, and armature of the posterior femur. The genitalia are also quite distinct.

Data on Distribution:

Peru, S. A., Vic Sani Beni, 840 m. a. s. l. Canal supplying drinking water, Oct. 10, 1935, F. Woytkowski. Field note 3562. (Type series). 7 apterous ♂♂, 8 winged ♂♂, 13 apterous ♀♀, 6 winged ♀♀.

Vic Sani Beni, 840 m. a. s. l. Brooks and pools of Sani Beni, Aug. 31, 1935, F. Woytkowski. Field note 3560. 12 apterous ♂♂, 1 winged ♂, 6 apterous ♀♀, 1 winged ♀.

Vic Sani Beni, 840 m. a. s. l. River Sani Beni, Sept. 5, 1935, F. Woytkowski. Field note 3551. 3 apterous ♂♂, 2 winged ♂♂, 6 apterous ♀♀, 2 winged ♀♀.

Vic Sani Beni, 840 m. a. s. l. In River Sani Beni, July-Aug., -1935, F. Woytkowski. Field note 3553b. 1 apterous ♀, 1 winged ♀.

Vic Sani Beni, 840 m. a. s. l. Tiny brook in jungle. Oct. 10, 1935, F. Woytkowski. Field note 3557. 1 apterous ♀.

Vic Sani Beni, 840 m. a. s. l. From River, Oct. 9, 1935, F. Woytkowski. Field note 3548. 1 winged ♂, 1 winged ♀.

Vic Sani Beni, 840 m. a. s. l. Brook on open cultivated land, Oct. 12, 1935, F. Woytkowski. Field note 3566. 2 apterous ♂♂.

Vic Sani Beni, 840 m. a. s. l. River S. Beni and adj. pools. Aug. 5, 1935, F. Woytkowski. Field note 3553d. 1 apterous ♀.

Vic Rio Negro, 790 m. a. s. l. River R. Negro, Oct. 28, 1935, F. Woytkowski. Field note 3568. 2 apterous ♀♀.

Vic Rio Negro, 790 m. a. s. l. in R. Negro, Nov. 4, 1935, F. Woytkowski. Field note 3553e. 5 apterous, ♂♂, 1 winged ♂, 1 apterous ♀.

Vic of San Pedro, 900 m. a. s. l. Jungle pools, May 15-29, 1935, F. Woytkowski. 3 apterous ♂♂.

Vic of San Pedro, 900 m. a. s. l. Pools and ponds May 15-19, 1935, F. Woytkowski. 1 apterous ♀.

Roqueron del Padre, Abad Cordulern, Azut Dept. Loreto. 1 apterous ♂.

Dept. Ayacucho Prov. La Mar. Sivia jungle 790 m. a. s. l. Brooks, June 24-30, 1941, F. Woytkowski. No. 425. 2 apterous ♀♀, 1 winged ♀.

Dept. Ayacucho Prov. La Mar Sivia jungle 790 m. a. s. l. Stagnant pools, June 24-30, 1941, F. Woytkowski. No. 426. 1 apterous ♂, 3 apterous ♀♀.

Dept. Ayacucho Prov. La Mar Sivia, Jungle 790 m. a. s. l. Stagnant boggy pools, June 18-19, 1941, F. Woytkowski. No. 428. 5 apterous ♂♂, 6 apterous ♀♀, 1 winged ♀.

Dept. Ayacucho Prov. La Mar Sivia jungle 790 m. a. s. l. Slow flowing brooks, June 16, 1941, F. Woytkowski. No. 429. 11 apterous ♂♂, 1 winged ♂, 10 apterous ♀♀.

Satipo, XII, '42, Pedro Paprzycki. 1 apterous ♂, 6 apterous ♀♀.

Satipo, Nov. 1942, Pedro Paprzycki. 4 apterous ♂♂, 11 apterous ♀♀.

Satipo, VII '42 and VI '42, Pedro Paprzycki. 33 apterous ♂♂, 35 apterous ♀♀.

Rhagovelia imitatrix n. sp.

(Fig. 3)

Size: Length	Width
3.40 mm. apterous ♂	1.26 mm. apterous ♂
4.06 mm. apterous ♀	1.70 mm. apterous ♀
3.80 mm. winged ♂	1.66 mm. winged ♂
4.32 mm. winged ♀	1.73 mm. winged ♀

Color: General color black, clothed with very fine gray-brown pubescence. Head with usual impressed lines well defined. Pronotum with

anterior half gray with a median orange area. Venter blue-gray; last abdominal segment and genital segments black. Base of first antennal segment, anterior and posterior acetabulae, base of femora, and all coxae yellow. Occasionally a small, shining, black spot on dorsum of last abdominal segment. Winged forms slightly darker than apterous forms; wings dark brown.

Structural Characteristics: Fusiform. Usual long hairs and setae present. Pronotum sutured off from mesonotum in apterous forms. **Apterous male:** anterior trochanter unarmed. Anterior tibia sinuate; slightly flattened at the apex. Pronotum much wider than long (L. 16, W. 75); mesonotum truncate (L. 80, W. 75) nearly reaching to the posterior border of the metanotum. Proportions of antennae: Seg. I: II: III: IV:: 80: 48: 48: 41; of intermediate legs: Fem.: Tib.: Tars. II: Tars. III:: 185: 125: 70: 60; of posterior legs: 125: 180: 10: 22. Angle of taper of abdomen increasing on last three segments. Venter of last abdominal segment with depression on each side of a median ridge. Posterior trochanter unarmed. Posterior femur not incrassate (L. 125, W. 20) and unarmed. Posterior tibia extremely elongate, straight and not armed. **Apterous female:** proportions of antennae: 77: 45: 45: 40; of intermediate legs: 187: 123: 64: 62; of posterior legs: 129: 168: 10: 27. Posterior trochanter, femur, and tibia the same as in the male. **Winged forms:** proportions of legs and antennae similar to apterous forms. Posterior femur as in apterous forms. Humeri prominent. Wings extending well beyond apex of abdomen. Venter with last segment as in apterous forms. Pronotum not produced into a spiniform process.

Data on Types: Holotype, apterous ♂; allotype, apterous ♀; holomorphotype, winged ♂; allomorphotype, winged ♀; paratypes, 88 apterous ♂♂, 127 apterous ♀♀; paramorphotypes, 1 winged ♂, 1 winged ♀. Described from specimens labeled: "Peru, S. A. Sept. 6-1937. F. Woytkowski. No. 3784. Dept. of Huanuco. Vic. of Huanuco Andes 2000 m. a. s. l. In streamlet." All type specimens are in the Francis Huntington Snow Entomological Collections.

Comparative Notes: This species is near **Rhagovelia longipes** Gould from which it differs in the proportions of the antennae and the male claspers which are broad and shovel-shaped rather than narrowed toward the apex as in **R. longipes.**

Data on Distribution:

Peru, S. A.: Dept. of Huanuco Vic. of Huanuco Andes, 2000 m. a. s. l. In streamlet Sept. 6, 1937, F. Woytkowski. No. 3784 (type series) 89 apterous ♂♂, 2 winged ♂♂, 128 apterous ♀♀, 2 winged ♀♀.

Dept. of Huanuco, Vic. Huanuco Rio Huallaga, Subtropical, May 24, 1937, F. Woytkowski. No. 3770. 1 apterous ♂.

Dept. of Huanuco, Vic. Leonpampa Jungle 800 m. a. s. l. Forest pools. Dec. 11, 1937, F. Woytkowski. No. 387. 2 apterous ♂♂, 7 apterous ♀♀.

Rio Paucartambo, Bot 1934 of Gertrude E. Nelson. 37 apterous ♂♂, 59 apterous ♀♀.

Rhagovelia jubata n. sp.

(Fig. 5)

Size: Length	Width
4.55 mm. apterous ♂	1.49 mm. apterous ♂
4.53 mm. apterous ♀	1.52 mm. apterous ♀
4.72 mm. winged ♀	1.66 mm. winged ♀

Color: General color red-brown, clothed with a golden pubescence. Pronotum with yellow band on anterior portion, the sides of this band becoming silvery behind the eyes. Pronotum slightly lighter in shade than the metanotum. Venter dark gray. Venter of last abdominal segment and genital segments of male brown with median yellow area. Basal portion of first antennal segments, all coxae, bases of anterior and posterior trochanters, bases of anterior and posterior femora yellow. In addition the anterior femur is marked with a yellow line running the full length of the ventral surface, also the posterior femur is conspicuously striped with the anterior and posterio-ventral surfaces yellow for their full length. The dorsum of the fifth abdominal segment of female darker than other abdominal segments.

Structural Characteristics: Apterous male: anterior trochanters unarmed, and pronotum wider than long (L. 68, W. 85); metanotum very much wider than long (L. 10, W. 95). Proportions of antennae: Seg. I: II: III: IV:: 84: 47: 44: 42; of intermediate legs: Fem.: Tib.: Tars. II: Tars. III:: 175: 130: 48: 64; of posterior legs: 152: 136: 8: 26. Abdomen tapering evenly posteriorly. Dorsum with scattered long hairs. Venter with median carina thickly beset with long hairs; ventral carina extending to the last abdominal segment. Posterior trochanter armed with one to several very short, and one to three longer teeth. Posterior femur greatly incrassate (L. 150, W. 50); armed on basal third with a row of very small teeth ending in a long spine, followed by two irregular rows of about seven smaller spines to the apex. Posterior tibia slightly sinuate, armed on its ventral surface with subequal teeth except for the apical tooth which is elongate and apposable to the longer teeth on the trochanter; a long spur is present at the apex of the tibia. **Apterous female:** pronotal proportions same as in male. Abdomen gradually tapering posteriorly. Antennal proportions: 75: 45: 43: 39; proportions of intermediate legs: 155: 111: 46: 64; of posterior legs: 135: 117: 8: 26. Posterior trochanter unarmed; posterior femur moderately incrassate (L. 135, W. 35) and armed with from none to four very small teeth and one small spine on basal third, then at the middle with one large spine and two irregular rows of approximately seven smaller spines to the apex. Posterior tibia very slightly sinuate, and armed with equal teeth and an elongate spine at apex. **Winged female:** proportions and armature similar to apterous female. Apex of pronotum beset with long dark hairs; not produced into a spiniform process.

Data on Types: Holotype, apterous ♂; allotype, apterous ♀; allomorphotype, winged ♀; paratypes, 40 apterous ♂♂, 24 apterous ♀♀. Described

from specimens from Aguaitia Dept. Loreto, Peru, S. A. Collected by F. Woytkowski, Sept. 1, 1946. All type specimens are in the Francis Huntington Snow Entomological Collections.

Comparative Notes: This species is perhaps closest to **Rhagovelia robusta** Gould from which it can be easily separated by the armature of the posterior femur and the lack of the stout tooth near the apex of the posterior tibia, which in **R. robusta** is followed by one or two smaller denticulations before the apex.

Data on Distribution:

Peru: Aguaitia Dept. Loreto Peru, S. A. IX, 1946, F. Woytkowski. (Type series). 41 apterous ♂ ♂, 25 apterous ♀ ♀, 1 winged ♀, 2 nymphs. Aguaitia Dept. de Loreto, IX, 1946. F. Woytkowski. 17 apterous ♂ ♂, 13 apterous ♀ ♀, 2 nymphs.

Rhagovelia nitida n. sp.

(Fig. 7)

Size: Length	Width
4.39 mm. apterous ♂	1.49 mm. apterous ♂
4.39 mm. apterous ♀	1.49 mm. apterous ♀
4.52 mm. winged ♂	1.82 mm. winged ♂
4.62 mm. winged ♀	1.80 mm. winged ♀

Color: General color brown, with prominent yellow markings, covered with a very short golden pubescence. Pronotum tan with uninterrupted yellow band on anterior quarter; slightly lighter line running longitudinally down middle of pronotum. Metanotum and dorsum of first abdominal segment darker than pronotum. Remainder of dorsum of abdomen tan to yellow with narrow darker areas at juncture of each of the segments. Venter, antennae, and genital segments practically unicolorus; legs slightly darker. Posterior femur slightly lighter at base and for three-fourths its length ventrally. Wings red-brown; veins darker, not prominent.

Structural Characteristics: Apterous male: anterior trochanter unarmed. Anterior tibia not dilate, very slightly excavate on apical third. Pronotum wider than long (L. 75, W. 90); metanotum very much wider than long (L. 10, W. 94). Proportions of antennae: Seg. I: II: III: IV:: 77: 49: 52: 44; of intermediate legs: Fem.: Tib.: Tars. II: Tars. III:: 150: 117: 45: 60; of posterior legs: 150: 163: 15: 30. Connexiva tapering sharply for the last three segments. Ventral carina sharply elevated between coxae of posterior legs with a depression on each side, becoming evanescent on fourth segment. Posterior trochanter thickly beset with long hairs; unarmed. Posterior femur greatly incrassate (L. 150, W. 57); ventral surface flattened and beset on basal third with long hairs. Armed on basal half with three very irregular rows of dark teeth and one long stout isolated spine on posterior margin of the ventral surface of leg slightly beyond basal third. Armed on apical half of femur with approximately six small, stout spines set in two irregular rows. Posterior tibia slightly sinuate and armed within with two rows of black teeth, the teeth at the apical three-fourths tending to

be slightly enlarged; armed at the apex with a brown spur. **Apterous female:** anterior tibia formed as in apterous male. Pronotum wider than long (L. 70, W. 90); metanotum much wider than long (L. 7, W. 92). Proportions of antennae: 70: 44: 45: 43; of intermediate legs: 130: 108: 42: 58; of posterior legs: 112: 147: 11: 26. Posterior trochanter unarmed. Posterior femur only moderately incrassate (L. 112, W. 25) and armed on the apical third with a small spine followed by three decreasing spines to the apex. Posterior tibia apparently unarmed. **Winged forms:** proportions and armature similar to the apterous forms. Pronotum not produced into a spiniform process.

Data on Types: Holotype, apterous ♂; allotype, apterous ♀; holomorphotype, winged ♂; allomorphotype, winged ♀; paratypes 4 apterous ♂♂, 3 apterous ♀♀; paramorphotypes, 3 winged ♀♀. Described from a series of specimens labeled: "B. W. I., Jamaica, St. Thomas Rd. to Corn Puss Gap, Aug. 1941. C. B. Lewis." All type specimens are in the Francis Huntington Snow Entomological Collections.

Comparative Notes: This species is near **Rhagovelia jubata** n. sp. from which it can be separated by the armature of the posterior femur. The male clasper is also distinct.

Data on Distribution:

Jamaica, B. W. I.: St. Thomas Rd. to Corn Puss Gap, Aug. 1941, C. B. Lewis. (Type Series). 5 apterous ♂♂, 1 winged ♂, 4 apterous ♀♀, 4 winged ♀♀.

St. Andrew Shooters Hill, e. 1800 ft. 3-XII-46. G. B. Thompson. 1 winged ♀.

St. Thomas, XI-14-46. G. B. Thompson. 2 apterous ♂♂, 1 apterous ♀, 4 nymphs.

St. Andreas, IV-17-47. G. B. Thompson. 7 apterous ♂♂, 8 apterous ♀♀, 15 nymphs.

Rhagovelia ornata n. sp.

(Fig. 9)

Size:	Length	Width
	5.98 mm. apterous ♂	1.63 mm. apterous ♂
	6.00 mm. apterous ♀	1.63 mm. apterous ♀

Color: General color red-brown; practically unicolorus. Last two segments of antennae and last tarsal segments of intermediate legs darker brown. Pronotum without lighter band at anterior margin.

Structural Characteristics: Apterous male: anterior trochanters unarmed. Anterior tibiae not dilate, slightly excavate on apical fifth. Pronotum wider than long (L. 90, W. 103); metanotum much wider than long (L. 11, W. 115). Proportions of antennae: Seg. I: II: III: IV:: 107: 55: 56: 55; of intermediate legs: Fem.: Tib.: Tars. II.: Tars. III:: 200: 150: 62: 75; of posterior legs: 192: 178: 41: 20. Connexiva tapering very slightly until last two segments. Ventral carina pronounced between the posterior coxae where the segment is depressed on each side, becoming evanescent on the next

to the last segment. Posterior trochanter armed with approximately twelve small, knob-like teeth. Posterior femur greatly incrassate (L. 192, W. 62) on most specimens; armed on basal half with a single row of approximately eighteen equally spaced spines which are graduated in size from small teeth on basal area to small spines at the middle. The apical half of the femur is armed with one isolated larger spine on the posterior margin at the apical third, also with two smaller rows of spines, the posterior row consisting of seven spines and the anterior row of six spines decreasing in size to the apex. None of the spines of the posterior femur are greatly enlarged. The posterior tibia is sinuate and recurved beyond apical third; armed with a double row of small teeth with a stout spine at apical third followed by two slightly enlarged teeth, and a stout spur at apex. **Apterous female:** anterior tibiae not dilate, slightly excavate on apical fourth. Proportions of antennae: 100: 51: 55: 50; of intermediate legs: 185: 140: 57: 73; of posterior legs: 160: 176: 18: 36. Abdomen with only a very slight taper from base to apex. Ventral carina distinct on basal segments, becoming evanescent on last three abdominal segments. Posterior trochanter armed with approximately two small, dark teeth. Posterior femur only slightly incrassate (L. 160, W. 30) and armed at the apical third with one small spine followed by four smaller spines to apex. Posterior tibia straight and armed on basal half with a few small teeth and with a spur at apex. **Winged forms:** unknown.

Data on Types: Holotype, apterous ♂; allotype, apterous ♀; paratypes, 32 apterous ♂♂, 59 apterous ♀♀. Described from series labeled: "Bolivia, S. A., Miguelito, May, 1938, A. M. Olalla." All type specimens are in the Francis Huntington Snow Entomological Collections.

Comparative Notes: This species is near to **Rhagovelia crassipes** Champion from which it can be separated by the armature of the posterior femur and tibia. The male clasper is also quite distinct.

Data on Distribution:

Bolivia, S. A.: Miguelito, May, 1938. A. M. Olalla. (Type series). 33 apterous ♂♂, 60 apterous ♀♀.

Rhagovelia perfidiosa, n. sp.

(Fig. 10)

Size: Length	Width
2.98 mm. apterous ♂	1.16 mm. apterous ♂
3.32 mm. apterous ♀	1.33 mm. apterous ♀
3.52 mm. winged ♂	1.46 mm. winged ♂
3.53 mm. winged ♀	1.50 mm. winged ♀

Color: General color brown, clothed with a golden pubescence. Pronotum with yellow band on anterior fifth, becoming silver behind the eyes. Mesonotum light brown with a median line and posterior margin yellow to tan. Dorsum of first abdominal segment blue-gray except for median brown area; fourth and fifth abdominal segments blue-gray with smaller median dark brown areas; sixth abdominal segment brown with yellow median area,

seventh abdominal segment and genital segments yellow. Venter blue-gray. Venter of last abdominal segment and genital segments yellow. Base of antennae, all acetabulae, coxae, trochanters, base of anterior and posterior femora, and total length of dorsal and ventral surfaces of intermediate and posterior femora yellow. Connexiva broadly yellow. Basal half of wings lighter than apical half.

Structural Characteristics: Apterous male: anterior trochanters unarmed. Anterior tibiae slightly dilate, excavate on apical two-fifths. Pronotum wider than long (L. 50, W. 67); metanotum much wider than long (L. 7, W. 57). Proportions of antennae: Seg. I: II: III: IV:: 50: 29: 29: 30; of intermediate legs: Fem.: Tib.: Tars. II: Tars. III:: 110: 80: 29: 47; of posterior legs: 88: 78: 4: 18. Abdomen tapering more sharply to apex on last three segments. Venter without median carina. Posterior trochanter armed with from one to nine very small knob-like teeth with one larger tooth near apex. Posterior femur greatly incrassate (L. 88, W. 30). Armed on basal third with a row of very small teeth; after the basal third with two irregular rows of spines. The anterior row of spines begins at the basal third with one long spine followed by three smaller spines which are followed by another long spine offset toward the anterior margin and three smaller spines to apex. The posterior row begins approximately at the middle with one large spine followed by four decreasing spines to apex. Posterior tibia slightly sinuate and armed with a double row of equal teeth throughout; armed at the apex with a long, stout spur. **Apterous female:** proportions of antennae: 55: 28: 30: 30; of intermediate legs: 110: 83: 34: 51; of posterior legs: 92: 80: 5: 22. Abdomen tapering evenly to apex. No median ventral carina. Posterior trochanter unarmed. Posterior femur greatly incrassate (L. 92, W. 30) and armed just before the middle with a long spine followed by approximately five smaller spines to apex. There is also a row of four small spines on the anterior margin of the ventral surface beginning at the apical third and continuing to apex. Posterior tibia slightly sinuate and armed with a double row of teeth that decrease in size to the apex; the apex is armed with a long, stout spur. **Winged forms:** proportion and armature same as for apterous forms. Apex of pronotum thickly beset with long, dark hairs; not continued into a spiniform process.

Data on Types: Holotype, apterous ♂; allotype, apterous ♀; holomorphotype, winged ♂; allomorphotype, winged ♀; paratypes, 81 apterous ♂♂, 85 apterous ♀♀; paramorphotypes, 5 winged ♂♂, 14 winged ♀♀. Described from series labeled: "Brazil, S. A.: A. M. Olalla, No. 379." All type specimens are in the Francis Huntington Snow Entomological Collections.

Comparative Notes: This species is near **Rhagovelia amazonensis** Gould but can be easily separated by the armature of the posterior femur and by the male claspers which are quite distinct.

Data on Distribution:

Brazil, S. A.: A. M. Olalla, No. 379. 82 apterous ♂♂, 6 winged ♂♂, 86 apterous ♀♀, 15 winged ♀♀. **(Type series).**

Rio Negro Manaos Region, Oct. 1935. A. M. Olalla. 3 apterous ♂♂, 2 winged ♂♂, 7 apterous ♀♀.

Rio Purus Castanha Region, Sept. 1935. A. M. Olalla. 1 winged ♀.

Vic Joao Pesson, (Sao Phelipe) River Jurua, 7-10, 9-20-36, A. M. Olalla. No. 375. 21 apterous ♂♂, 1 winged ♂, 24 apterous ♀♀, 2 winged ♀♀.

State of Para Lago Grande, Feb., '39, A. M. Olalla. 19 apterous ♂♂, 27 apterous ♀♀.

Rhagovelia torquata n. sp.

(Fig. 11)

Size:	Length	Width
	3.40 mm. apterous ♂	1.33 mm. apterous ♂
	3.84 mm. apterous ♀	1.37 mm. apterous ♀

Color: General color black, covered with a golden pubescence. Anterior quarter of pronotum gray behind eyes with median yellow area. Venter very dark gray. Base of first segment of antennae, all coxae, anterior and posterior trochanters and basal half of anterior femora yellow.

Structural Characteristics: Pronotum in apterous forms abbreviated, rounded behind and exposing much of mesonotum. **Apterous male:** anterior trochanters unarmed; anterior tibiae only slightly dilate and not excavate. Pronotum short (L. 32, W. 72); mesonotum longer than pronotum and truncate at apex (L. 35, W. 66); mesonotum surrounded laterally by metanotum (L. 8, W. 82). Proportions of antennae: Seg. I: II: III: IV:: 66: 42: 39: 40; of intermediate legs: Fem.: Tib.: Tars. II: Tars. III:: 148: 105: 46: 57; of posterior legs: 130: 107: 7: 20. Abdomen tapering to apex, angle of taper increasing for last three segments. Slight ventral carina extending to last abdominal segment. Posterior trochanter unarmed. Posterior femur moderately incrassate (L. 130, W. 33) and armed on basal third with a row of several small teeth; just after basal third with a long, black spine followed by seven shorter spines to apex. Posterior tibia slightly sinuate and armed on basal two-thirds with a double row of closely-set, subequal teeth, on apical third with smaller, wide-spaced teeth; armed at apex with a stout spur. Posterior femora extending well beyond apex of abdomen. **Apterous female:** anterior tibiae formed as in apterous male. Pronotum slightly longer than in male (L. 40, W. 75); mesonotum truncate (L. 30, W. 80); metanotum formed as in male (L. 8, W. 83). Proportions of antennae: 65: 38: 37: 37; of intermediate legs: 135: 95: 43: 54; of posterior legs: 115: 95: 7: 20. Abdomen tapering as in male. Posterior trochanter unarmed. Posterior femur not as incrassate as in male (L. 115, W. 25) and armed before the middle with a long spine followed by five smaller decreasing spines to apex. Posterior tibia armed on basal half with a double row of closely set teeth, apparently unarmed on apical half except for a stout spur at apex. **Winged forms:** unknown.

Data on Types: Holotype, apterous ♂; allotype, apterous ♀; paratypes, 1 apterous ♂, 1 apterous ♀. Described from series labeled: "Peru, S. A. Dept. Huanuco Vic. of Afilador, Shady Jungle, 670 m. a. s. l. June 10-30, 1937, F. Woytkowski. No. 3766." All type specimens are in the Francis Hunting-

ton Snow Entomological Collections.

Comparative Notes: This species is close to **Rhagovelia abrupta** Gould from which it can be separated by the fact that the claspers do not project posteriorly beyond the genital segments. It is also near **Rhagovelia vivata** n. sp. but can be separated by the lack of teeth on the posterior trochanter. The male clasper is distinct and readily separates it from either of the above mentioned forms.

Data on Distribution:

Peru, S. A.: Dept. Huanuco Vic of Afilador, Shady Jungle 670 m. a. s. l. June 10-30, 1937, F. Woytkowski. No. 3766. (Type series). 2 apterous ♂♂, 2 apterous ♀♀.

Dept. Huanuco Vic Afilador, Jungle Brooks, 800 m. a. s. l. June 4, 1937, F. Woytkowski. No. 3771. 3 apterous ♂♂, 1 apterous ♀.

Dept. Huanuco Vic Afilador, Jungle Brooks, 800 m. a. s. l. June 8-9, 1937, F. Woytkowski. No. 3767. 1 apterous ♂.

Rhagovelia trepida n. sp.

(Fig. 4)

Size:	Length	Width
	3.72 mm. apterous ♂	1.33 mm. apterous ♂
	3.78 mm. apterous ♀	1.33 mm apterous ♀

Color: General color brown, covered with golden pubescence. Pronotum with anterior half, and lateral and posterior margins yellow. Margins of connexiva broadly yellow. Venter blue-gray. Venter of last abdominal segment with the exception of a narrow median line, and genital segments yellow. Base of antennae, all trochanters, all coxae, bases of anterior and posterior femora yellow. The posterior femora are yellow with the exception of a prominent brown stripe on the dorso-posterior surface.

Structural Characteristics: Pronotum in apterous forms abbreviated and rounded behind, not covering mesonotum. **Apterous male:** anterior trochanter unarmed; anterior tibia not dilate, and only slightly excavate on apical half. Pronotum abbreviated (L. 33, W. 70), exposing much of mesonotum; mesonotum truncate (L. 26. W. 73) and not covering metanotum. Metanotum very narrow (L. 6, W. 85). Proportions of antennae: Seg. I: II: III: IV:: 57: 30: 37: 34; of intermediate legs: Fem.: Tib.: Tars. II: Tars. III:: 123: 96: 40: 50; of posterior legs: 106: 88: 7: 20. Angle of taper of abdomen increasing on last three segments. Slight ventral carina extending the complete length of the abdomen. Posterior trochanter unarmed. Posterior femur greatly incrassate (L. 106, W. 38) and armed on basal half with a row of very small teeth followed at approximately the middle by a larger spine and nine smaller, closely set spines to the apex. Also armed with a short anterior row of very small teeth running from apical third to apex. Posterior tibia slightly sinuate and armed with closely set teeth throughout, with the tooth at approximately the apical fifth enlarged into a small spur; also armed with a spur at apex. **Apterous female:** pronotum formed as in male (L. 37, W. 80), mesonotum as in male (L. 27, W. 85); metanotum as in male (L. 7, W. 90). Proportions of antennae: 55: 34: 39: 34; of intermediate

legs: 123: 95: 39: 52; of posterior legs: 98: 95: 9: 23. Abdomen tapering to apex. Venter without median carina. Posterior trochanter unarmed. Posterior femur not as incrassate as in the male (L. 98, W. 21) and armed on basal half with one small tooth or may be unarmed on basal half; apical half armed with one long spine just beyond the middle followed by three to five smaller, rapidly decreasing teeth to apex. Posterior tibia straight and apparently unarmed except for a small spur at apex. **Winged forms:** unknown.

Data on Types: Holotype, apterous ♂; allotype, apterous ♀; paratypes, 36 apterous ♂ ♂, 23 apterous ♀ ♀. Described from specimens labeled: "Sao Paulo, Brazil. XI-17-1935, Nat. Sci. Mus., Via A. M. Olalla." All type specimens are in the Francis Huntington Snow Entomological Collections.

Comparative Notes: This species belongs in the group of **Rhagovelia** with **R. abrupta** Gould because of its pronotal proportions. The armature of the posterior femur, and the distinctive male clasper will serve to separate it from **R. abrupta.**

Data on Distribution:

Brazil, S. A.: Sao Paulo Nov. 17, 1935, Nat. Sci. Mus., Via A. M. Olalla. (Type series). 37 apterous ♂ ♂, 24 apterous ♀ ♀.

Rhagovelia vivata n. sp.

(Figs. 12, 12A)

Size: Length	Width
3.67 mm. apterous ♂	1.39 mm. apterous ♂
4.05 mm. apterous ♀	1.46 mm. apterous ♀
4.78 mm. winged ♂	1.59 mm. winged ♂
4.45 mm. winged ♀	1.45 mm. winged ♀

Color: General color black, covered with a golden pubescence. Anterior portion of pronotum yellow becoming silvery behind the eyes. Venter dark gray; last abdominal segment black. Base of antennae, all coxae, anterior and posterior trochanters, bases of anterior femora yellow. Wings brown, slightly lighter in color at base.

Structural Characteristics: Pronotum abbreviated and rounded behind in apterous forms, exposing much of mesonotum. Anterior tibiae only slightly dilate, flattened on apical third. **Apterous male:** anterior trochanter unarmed. Pronotum short (L. 27, W. 76); mesonotum truncate at apex and longer than pronotum (L. 40, W. 70); metanotum much wider than long (L. 10, W. 80). Proportions of antennae: Seg. I: II: III: IV:: 68: 38: 38: 40; of intermediate legs: Fem.: Tib.: Tars. II: Tars. III:: 148: 110: 52: 60; of posterior legs: 130: 104: 9: 26. Angle of taper of abdomen increasing on the last two segments. Abdomen with ventral carina extending to the last segment; venter of last abdominal segment with slight median depression so as to form an indistinct longitudinal trough. Posterior trochanter armed with from five to eight small, dark teeth. Posterior femur greatly incrassate (L. 130, W. 48); slightly flattened on ventral surface. Armed with two widely separated rows of spines. The anterior row, beginning at base and extending to apical third, consists of approximately nine very small spines. The

posterior row begins on basal third with a dense cluster of small, subequal teeth followed by a long, black spine and seven smaller, decreasing spines to apex. Posterior tibia slightly sinuate and armed with closely set, irregularly placed teeth, and a stout spur at the apex. **Apterous female:** pronotum formed as in male (L. 30, W. 75); mesonotum as in male (L. 41, W. 76); metanotum also as in male (L. 9, W. 90). Proportions of antennae: 67: 40: 38: 37; of intermediate legs: 142: 105: 48: 60; of posterior legs: 117: 95: 8: 24. Abdomen tapering evenly to apex. Venter without median carina. Posterior trochanter unarmed. Posterior femur not as incrassate as in the male (L. 117, W. 28) and armed before the middle with a long spine followed by six decreasing spines to apex. Posterior tibia very slightly sinuate; armed on basal half with a double row of small, subequal teeth, the apical half armed only with the stout spur at apex. **Winged forms:** proportions and armature same as for apterous forms. Wings extend well beyond apex of abdomen. Pronotum not prolonged into a spiniform process.

Data on Types: Holotype, apterous ♂; allotype, apterous ♀; holomorphotype, winged ♂; allomorphotype, winged ♀; paratypes, 1 apterous ♂, 3 apterous ♀♀; paramorphotypes, 1 winged ♂, 2 winged ♀♀. Described from series labeled: "Satipo, Peru, S. A., XII, '42, Pedro Paprzycki." All type specimens are in the Francis Huntington Snow Entomological Collections

Comparative Notes: This species belongs in the group with **Rhagovelia abrupta** Gould which has the pronotum abbreviated and rounded behind. It is perhaps closest to **Rhagovelia torquata** n. sp. from which it can be separated by the armature of the posterior femur. The male clasper is very distinctive and readily separates it from all other **Rhagovelia.**

Data on Distribution:

Peru, S. A.: Satipo XII-42 Pedro Paprzycki. (Type series). 2 apterous ♂♂, 2 winged ♂♂, 4 apterous ♀♀, 3 winged ♀♀.

Dept. Ayacucho Prov. La Mar Sivia Jungle, 790 m. a. s. l. Bks. Apurimac Riv., June 15-28, 1941, F. Woytkowski. No. 4212. 3 apterous ♂♂, 5 apterous ♀♀.

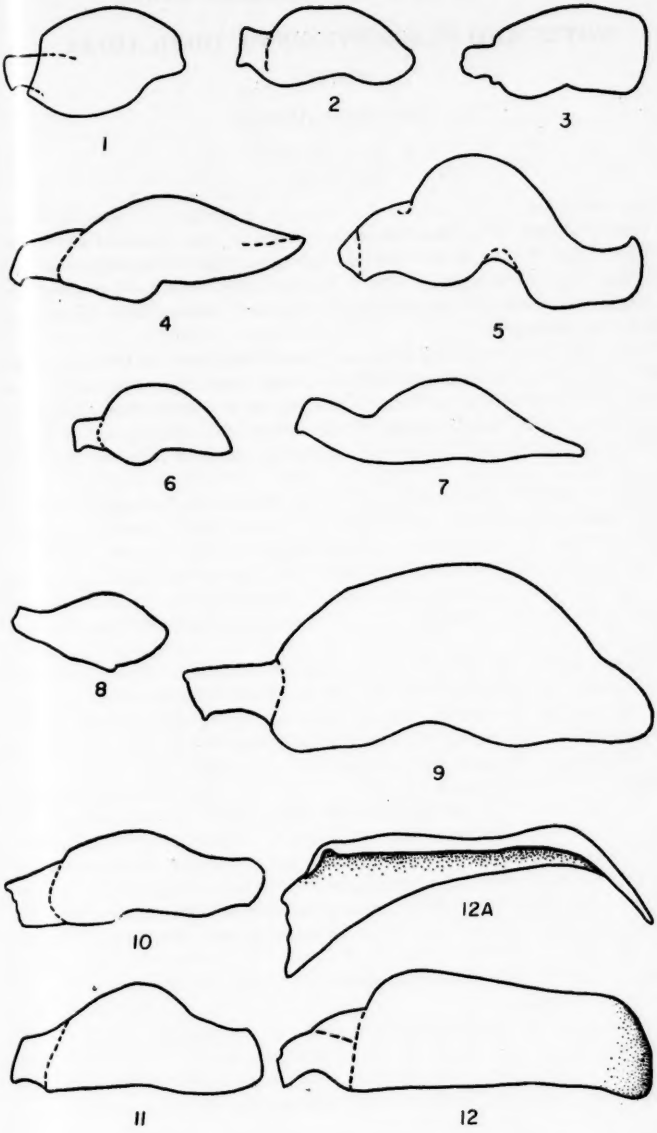
Vic Sani Beni, 840 m. a. s. l. Brooks and pools of Sani Beni, Aug. 31, 1935, F. Woytkowski. Field Note 3560. 6 apterous ♂♂, 4 apterous ♀♀.

Vic of San Pedro, 900 m. a. s. l. Jungle pools, May, 15-29, 1935, F. Woytkowski. 4 apterous ♂♂.

Satipo, Nov. 1942. Pedro Paprzycki. 2 apterous ♂♂, 1 winged ♂, 1 apterous ♀, 1 winged ♀.

EXPLANATION OF PLATE

Fig. 1. **Rhagovelia bisignata** Bacon; right clasper, lateral view.
Fig. 2. **Rhagovelia fontanalis** Bacon; right clasper, lateral view.
Fig. 3. **Rhagovelia imitatrix** Bacon; right clasper, lateral view.
Fig. 4. **Rhagovelia trepida** Bacon; right clasper, lateral view.
Fig. 5. **Rhagovelia jubata** Bacon; right clasper, lateral view.
Fig. 6. **Rhagovelia evidis** Bacon; right clasper, lateral view.
Fig. 7. **Rhagovelia nitida** Bacon; right clasper, lateral view.
Fig. 8. **Rhagovelia deminuta** Bacon; right clasper, lateral view.
Fig. 9. **Rhagovelia ornata** Bacon; right clasper, lateral view.
Fig. 10. **Rhagovelia perfidiosa** Bacon; right clasper, lateral view.
Fig. 11. **Rhagovelia torquata** Bacon; right clasper, lateral view.
Fig. 12. **Rhagovelia vivata** Bacon; right clasper, lateral view.
Fig. 12.A. **Rhagovelia vivata** Bacon; right clasper, dorsal view.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NOTES AND DESCRIPTIONS OF DORILAIDAE

Part II

(Pipunculidae—Diptera)

D. ELMO HARDY
Ames, Iowa.

The writer has long realized that there is a complex of species which are closely related to **Dorilas alternatus** (Cresson). The status of **alternatus** has never been cleared up and the species has not been definitely recognized since the original description. The following notes have been prepared in an attempt to establish the identity of Cresson's species and to describe some of the related forms.

It is now quite apparent that the female specimen in Cresson's type series was not the same species as the holotype male. Homoeotypic females which were compared with Cresson's allotype by the writer have proved to be specimens of **D. loweii** (Kert). Examination of a large series of **loewii** females has failed to disclose any way of distinguishing it from the specimen which Cresson described.

Male specimens have been studied from Huachuca Mountains, Arizona, which seem to be typical **alternatus**. It has not been possible to obtain specimens from the type locality in New Mexico.

The species is very close to **D. cinctus** (Banks) but is larger in size, the antennae are very short acute, the male hypopygium is much smaller from a dorsal view and the harpagones are more rounded and slightly enlarged at apices.

The diagnostic characters are as follows: Antennae brownish black, third segment small, broadly acute (see fig. 25B*). Third section of costa twice as long as the fourth, stigma filling all of the third section. Ultimate section of the fourth vein straight, apical cell very narrowly open at the wing margin. Crossvein r-m situated at about the basal one-fourth of the discal cell. Hypopygium very short, about one-fifth as long as the fifth segment and with a broad apical depression (fig 25C of the writer's revision). From a ventral view the coxopodite is about as wide as long. The membranous area on the eighth segment extends almost to the posterior margin of that segment. The harpagones are equal to slightly longer than the coxopodite, they are rather strongly swollen on their outer edges and rounded at their apices. The two harpagones are about equal in size and shape (fig. 1a).

Length: 3.5-4.4 mm; wings, 4.0-5.0 mm.

Female unknown.

The above notes are based upon a study of the type male from Cloudcroft, New Mexico, and upon specimens from Sunnyside Canyon, Huachuca Mts., Ariz. July 9, 1940 (D. E. Hardy). The figure shown in this paper was made from a specimen from the latter locality.

*Hardy, 1939, Univ. of Kans. Sci. Bull., 19:203.

Dorilas dreisbachi n. sp.

(Figs. 2 a,b)

This species keys out with **Dorilas alternatus** in couplet 29 of the writer's key to the genus (*, page 58). It differs by having the third section of the costa equal to the fourth, the abdomen subshining and the genitalia much larger and differently developed.

Male. Head: Eyes joined on the front for a distance equal to the length of about sixteen eye facets. Front and face black in ground color, densely covered with silvery pubescence. Antennae brown, with a faint tinge of yellowish on the third segment. Third segment acute (fig. 2a), rather densely pale pubescent. Labellum yellow. **Thorax:** Mesonotum and scutellum lightly brownish pollinose, pleurae gray. Humeri black in ground color. Scutellum with very short, fine marginal hairs. Propleura apparently bare (the head obscures the prothorax on this specimen). Halteres black. **Legs:** Coxae and trochanters dark brown to blackish. Femora chiefly black, with narrow yellow apices and bases. Tibiae yellow except for broad brown to black median discolorations. Tarsi yellow brown to blackish. Hind femora brightly polished on inner sides, otherwise grayish pollinose. Flexor spines very weak and no long hairs on the femora. Hind tarsi rather strongly flattened. **Wings:** Hyaline, stigmata pale yellowish brown and filling all of the third costal sections of the wing. Third section about equal in length to the fourth, the two sections combined are one and one-half times longer than the fifth. The r-m crossvein is situated near the basal one-fourth of the discal cell and the last section of the fourth vein is straight. The apical cell is strongly narrowed in the wing margin. The last section of the fifth vein is equal in length to the m crossvein and not quite two times as long as the petiole of the cubital cell. **Abdomen:** Lightly subshining black with apices of segments faintly cinereous. First tergum all gray and with no conspicuous lateral bristles. Terga two to four broadly interrupted in the middle and lightly grayed on the sides. Fifth tergum faintly cinereous on apical margin. **Hypopygium:** Almost symmetrical from a dorsal view. About equal in length to the fifth abdominal segment and with a small but distinct apical depression and no apical keel. Sixth and seventh terga plainly visible from a dorsal view. From a ventral view the coxopodite is much longer than wide and the posterior margin has just a shallow concavity. The harpagones are very irregular, they are very broad at their bases and narrowed apically toward the inner sides. The two harpagones are rather similar in shape but the outer is more curved inward than the inner (fig. 2b).

Length: body, 4. mm. wings, 4.8 mm.

Female unknown.

Holotype male: Shiawassee Co., Mich., June 13, 1943 (R. R. Dreisbach).

Type returned to Mr. R. R. Dreisbach, Midland, Mich.

Dorilas (Eudorylas) michiganensis n. sp.
(Figs. 3 a, b)

This species runs into couplet 27 of the writer's key but has the third section of the costa equal in length to the fourth. It differs from **alternatus** by having the ultimate section of the fourth vein sinuate, the third costal section not longer than the fourth and the abdomen not fasciated.

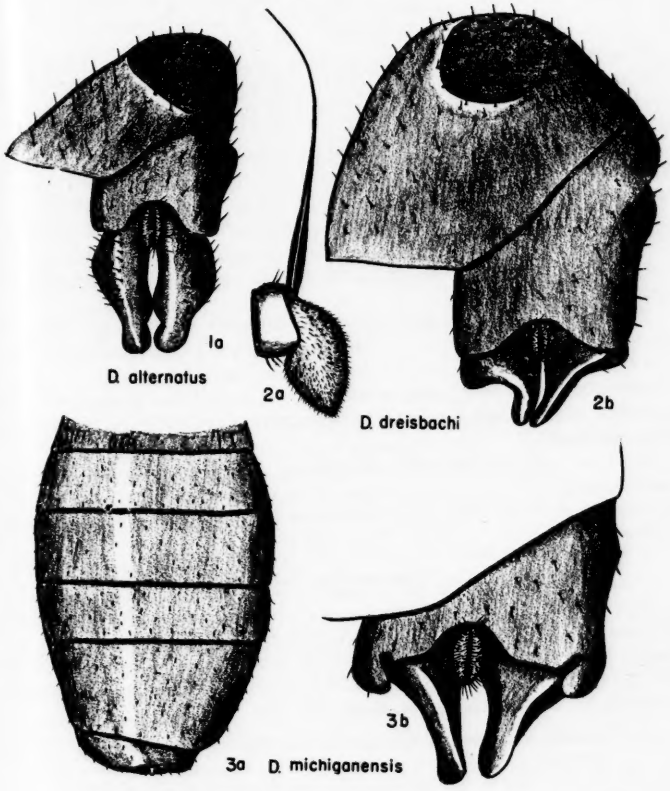
Male. Head: Junction of the eyes equal to the length of ten facets. Front and face densely silvery gray pubescent, lower portion of occiput gray, upper part and vertex shining black, lightly brown pollinose. Antennae dark brown, third segment acute, shaped as in **dreisbachi** n. sp. and whitish pubescent. **Thorax:** Lightly brownish pollinose on the dorsum, gray on the sides. Humeri and halteres black. Scutellum with very inconspicuous marginal hairs. Propleura bare. **Legs:** Coxae and femora black except for the narrow yellow apices of the latter. Femora gray pollinose above the black ground color, except for the polished inner surfaces of the hind pair. Tibiae chiefly black with broad yellow bases and narrow yellow apices. Tarsi yellow brown, the hind pair somewhat flattened. Flexor spines weak, all femora with a row of moderately long pale hairs running along the inner side near the top margin, these are especially well developed on the middle legs. Hind tibiae without strong hairs or bristles on the outer side. **Wings:** Hyaline, distinctly irridescent. Stigmata pale smoky brown and filling almost all of the third costal sections. Third section equal in length to the fourth, the two combined are about equal to the fifth section. Crossvein r-m situated at the basal one-third of the discal cell. Ultimate section of the fourth vein very strongly curved. Last section of the fifth vein shorter than the m crossvein and about two times longer than the petiole of the cubital cell. **Abdomen:** First tergum densely gray pollinose with four or five strong bristles in a row on each side. Remainder of abdomen subopaque, brassy black in ground color dusted with brownish pollen. Extreme lateral margins grayish. The abdomen is widest at about segments three to four and the terga are very sparsely covered with short inconspicuous hairs. **Hypopygium:** Short and rather inconspicuous from dorsal view, only about one-fourth to one-third as long as the fifth abdominal segment and with a moderately large apical membranous area and a small apical keel (fig. 3a). From a ventral view the genitalia is developed somewhat as in **dresibachi** except that the coxopodite is broad and not so elongate, and is developed into a pair of lobes at apices. The harpagones are also differently shaped. The posterior margin of the coxopodite is rather deeply "U" shaped in the middle and the lateral margins each have a curved projection at the apex. The harpagones are shorter than the coxopodite. They are rather similar in size and shape and rounded at the apices (fig. 3b).

Length: body 4.4 mm; wings, 4.5 mm.

Female unknown.

Holotype male and one paratype male: Newago Co., Mich. July 30, 1934 (R. R. Dreisbach).

Holotype being returned to Mr. Dreisbach, paratype deposited in the U. S. National Museum collection.



EXPLANATION OF PLATE

Fig. 1. **Dorilas alternatus** (Cresson). a. male hypopygium, ventral view.
Fig. 2. **D. dreisbachi** n. sp. a. antenna; b. male hypopygium, ventral view.
Fig. 3. **D. michiganensis** n. sp. a. male abdomen, dorsal view. b. male hypopygium, ventral view.

A NEW MALLOPHAGA FROM A RUFFED GROUSE

K. C. EMERSON
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Goniodes bonasus n. sp.
(Figures 1-4)

Female. Head circumfasciate; clypeal margin broadly rounded with prominent angles. Temple angle with lateroventral process bearing a long seta and a short spine. Head wider than long, greatest width at the temples which are expanded.

Prothorax one-half as broad as head, with nearly straight sides that diverge from front to rear. Pterothorax triangular in shape without lateral indications of meso-metathoracic junction. Legs characteristic of genus.

Male. Head with clypeal margin rounded, squarish posterior to antennae. Clavus prominent with a long seta. First antennal segment enlarged and without a process; third produced distally at right angles to the fourth segment.

Prothorax and pterothorax similar to those of the female except in chaetotaxy. Abdomen more rounded than in female. Pleurites each with 3 or 4 long dorsal setae.

Genitalia with a long broad basal plate and short broad parameres; each paramere with an attached short narrow appendage which points inward at a right angle.

Holotype male from **Bonasa umbellus** ssp., collected in Ravalli Co., Montana. Allotype female from the same series. Paratypes from the same collection, and from the same host collected on Newton Ranch, Pagosa Springs, Colorado.

Comparative Notes

This species belongs to Group i, erected by Miss Clay in her revision of the genus. The accompanying figures indicate the characteristics of the species clearly and easily separate it from others found in North America. The following key will help to separate the various species of this genus found on North American game birds.

1. Temples expanded and similar in the two sexes. ..... 2.
   Temples exhibiting sexual dimorphism in shape, being little, or not at all, expanded in the male, and being expanded to a greater extent in the female. ..... 3.
2. The distal post-axial angle of the third antennal segment prolonged at right angles to the fourth segment..... **ortygis**
   The distal post-axial angle of the third antennal segment prolonged parallel to the fourth segment..... **dispar**
3. Spinous process present on the female genital region..... 4.
   No spinous process on the female genital region. ..... 5.
4. Paramere with an inward pointing appendage. ..... **nebraskensis**
   Paramere without an appendage. ..... **cervinicornis**

5. Clypeal band narrow. **colchici**
Clypeal band wide. 6.

6. Temples scarcely expanded in the female, being no wider than the preantennal region. **mamillatus**
Temples expanded in the female, being wider than the preantennal region. 7.

7. Ventral spinous process on genital region extremely small; 5-6 short hairs on the margin of the vulva. **centrocerci**
Ventral spinous process on genital region normal to large in size; 7 or more long hairs on the margin of the vulva. 8.

8. Genitalia normal in appearance. 11.
Narrow appendage on the paramere which points inward. 9.

9. Appendages on parameres touching each other centrally. 10.
Appendages on parameres not touching. **bonasus**

10. Clypeal band same width throughout. **lagopi**
Clypeal band wider on front than lateral margin of the head. **corpulentus**

11. Lateral margin of vulva straight with numerous long hair bunched on distal half of lateral margin. **merriamanus**
Lateral margin of vulva irregular with numerous long hairs along all the lateral margin. **cupido**

HOST LIST

Goniodes bonasus n. sp. **Bonasa umbellus** (probably) **umbelloides** (Douglas), Gray Ruffed Grouse.

Goniodes centrocerci Simon 1938—**Centrocercus urophasianus** (Bonaparte). Sage Hen.

Goniodes cervinicornis Giebel 1874—**Gennaeus nycthemerus**, Silver Pheasant.

Goniodes colchici Denny 1842—**Phasianus colchicus torquatus** Gmelin, Ring-necked Pheasant.

Goniodes corpulentus Kellogg and Mann 1912—**Canachites canadensis osgoodi** Bishop, Alaska Spruce Grouse.

Goniodes cupido Rudow 1870—**Tympanuchus cupido pinnatus** (Brewster), Greater Prairie Chicken.

Goniodes dispar Burmeister 1838—**Perdix perdix perdix** (Linnaeus), European Partridge.

Goniodes lagopi (Linnaeus 1758)—**Lagopus lagopus albus** (Gmelin), Willow Ptarmigan.

Goniodes mamillatus Rudow 1870—**Lophortyx californica californica** Ridgway, Valley Quail.

Goniodes merriamanus Packard 1873—**Dendragapus obscurus richardsonii** (Douglas), Richardson's Grouse.

Goniodes nebraskensis Carriker 1946—**Pedioecetes phasianellus campestris** Ridgway, Prairie Sharp-tailed Grouse.

Goniodes ortygis Denny 1842—**Colinus virginianus virginianus** (Linnaeus). Eastern Bob-white.

A note on the identity of **Geniodes merriamanus** Packard 1873.

Packard described this species from a single male from **Dendragapus obscurus richardsonii** (Douglas), Richardson's Grouse. In 1940, Clay

described **Goniodes simoni** from **Dendragapus obscurus obscurus** (Say), Dusky Grouse.

After examining a large series of **Goniodes** from each host, the author can find no difference in the material from the two hosts. In view of Carriker's statement, it is beyond reasonable doubt that **G. simoni** Clay is a synonym of **G. merriamanus** Packard.

As Packard's type is apparently lost, I designate as neotype a female from Richardson's Grouse, **Dendragapus obscurus richardsonii** (Douglas), from Ravalli Co., Montana; and as neallotype a male from the same collection. Many neoparatypes from the same host from this collection and from Missoula Co., Montana, will be distributed to other collections.

Acknowledgment

Most of the material used for this study was furnished by Dr. William L. Jellison and the Rocky Mountain Laboratory, Hamilton, Montana, for which the author is grateful.

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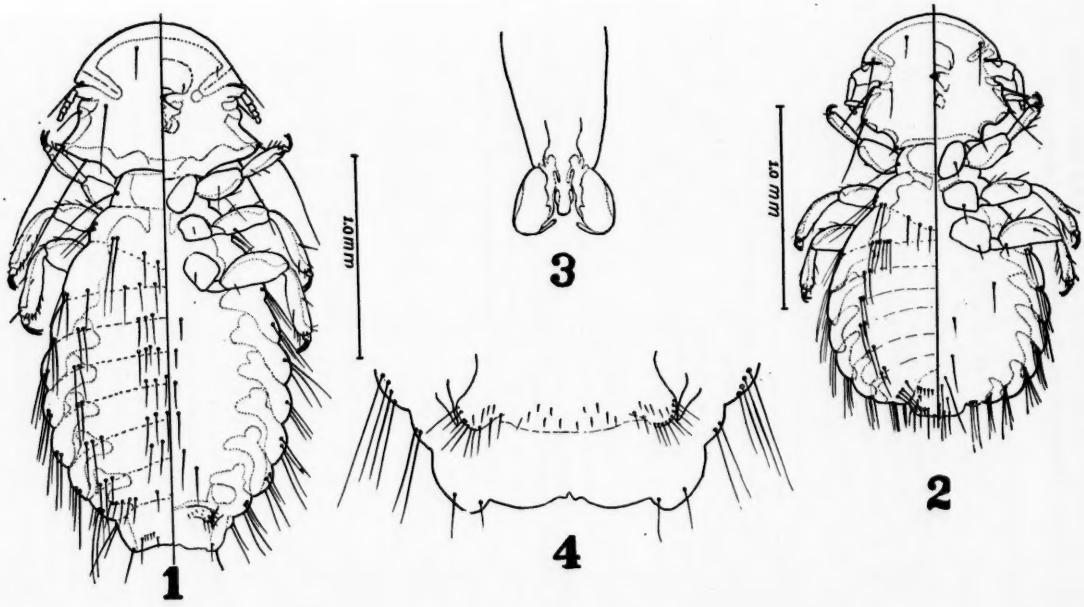
EXPLANATION OF PLATE

All figures refer to **Goniodes bonasus** n. sp.:

1. Dorsal-ventral view of the female.
2. Dorsal-ventral view of the male.
3. Male genitalia.
4. Ventral view of the genital region of the female.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SOME NEW SPECIES OF DELPHACODES (Homoptera, Fulgoridae, Delphacinae)

Part IV

R. H. BEAMER*
Lawrence, Kansas.

31 **Delphacodes cornuta** n. sp.

Brachypterous Form:

Resembles **Delphacodes waldeni** (Metcf.) but with definite color on parts of elytra instead of just brown veins and aedeagus ending in a cornucopia-shaped apex. Length, ♂ 2.6 mm.; ♀ 2.8 mm.

Structure: First antennal segment about twice as long as wide; front about one-third longer than greatest width, slightly narrowed toward either end, more so toward base, strongly tricarinate; crown about as long as width between eyes; elytra slightly longer than wide, apices truncate, veins raised.

Color: General color brown; pronotum with three longitudinal light vittae; elytra of female with region between veins darker, in male border and claval veins lighter; abdomen in female with three more or less definite light longitudinal vittae, male with only median longitudinal stripe definite.

Genitalia: In lateral view pygofer much wider than long; narrowed dorsally; anal segment rectangular, widest at outer end with a pair of more or less triangular-shaped processes almost as long as segment arising at outer ventral corner; aedeagus about as long and wide as style, curved ventrally, sides almost parallel to outer third where it flares into a cornucopia-shaped, sharp apex; styles long, sides almost parallel throughout, sinuately curved with a broad tooth almost as long as width of shaft at inner apical corner; aedeagal brace about twice as wide as width of style and twice as long as own width, outer dorsal corner sharpened; in caudal view aedeagal brace scarcely projected dorsally; styles long, sinuate, avicephaliform, beak on outside.

Holotype ♂, La Belle, Fla., March 3, 1947, R. H. Beamer; allotype ♀ and one ♂ paratype, July 7, 16, 1939, R. H. Beamer; 1 ♂ paratype, Royal Palm State Park, Fla., March 16, 1947, L. D. Beamer. Types in the Snow Entomological Collections.

32. **Delphacodes quadridentis** n. sp.

Brachypterous Form:

Resembling **Delphacodes acuministyla** Dozier but males without brown tips to elytra and anal segment with two pairs of processes instead of one. Length ♂ 1.5 mm.; ♀ 1.8 mm.

Structure: First segment of antennae slightly longer than wide; front a little more than twice as long as wide, widest near apical third, considerably narrower at base than at apex, tricarinate, median carina quite heavy; crown slightly longer than wide, carinae definite; elytra almost twice as long as wide, apices rounded.

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*Contribution from the Department of Entomology, University of Kansas.

Color: General color of female stramineous, male with dorsum of about basal half of abdomen more or less dark brown and genital capsule except anal tube, black.

Genitalia: In lateral view, pygofer more or less rectangular, slightly longer on ventral margin; anal segment with two pairs of processes, one pair short and blunt, the other about three times as long as first, sharp; aedeagus narrowed near middle with margins almost parallel on outer half, dorsal margin with about seven teeth; aedeagal brace not visible; styles with sides almost parallel to slightly enlarged region just before apices; in caudal view aedeagal brace extended dorsally more than basal width, tip slightly bifid; styles rather short with avicephaliform apices, beak short, on inner margin.

Holotype ♂, allotype ♀, 31 ♂♂ and 37 ♀♀ paratypes, Ocean Springs, Miss., March 3, 1947, R. H. Beamer; other paratypes: 5 ♂♂ and 6 ♀♀, Ocean Springs, Miss., March 3, 1947, L. D. Beamer; 9 ♂♂ and 4 ♀♀, Sanford, Fla., March 11, 1947, R. H. Beamer; 3 ♂♂ and 1 ♀, Sanford, Fla., March 11, 1947, L. D. Beamer; 7 ♂♂ and 1 ♀, Naples, Fla., March 16, 1947, R. H. Beamer; 1 ♂ and 4 ♀♀, Mims, Fla., March 18, 1947, R. H. Beamer; 1 ♂, Hilliard, Fla., March 18, 1947, R. H. Beamer; 20 ♂♂ and 14 ♀♀, Punta Gorda, Fla., March 12, 1947, R. H. Beamer; 1 ♂, Zolpho Springs, Fla., July 15, 1939, R. H. Beamer; 5 ♂♂, Hilliard, Fla., Oct. 5, 1938, P. W. Oman; 1 ♂, Zolpho Springs, Fla., June 15, 1939, P. W. Oman.

Types and paratypes in Snow Entomological Collections, paratypes in United States National Museum.

33. **Delphacodes aetocephala** n. sp.

Brachypterous Form:

Resembling **Delphacodes parcula** Ball but anal segment of male with a pair of sharp processes and aedeagus in lateral view resembling the head of an eagle. Length ♂ 2.0 mm.; ♀ 2.5 mm.

Structure: First antennal segment slightly longer than wide, front almost twice as long as wide, widest near outer third, narrowed toward each end, more so toward base, barely more than half as wide at base as at widest place, strongly tricarinate; crown slightly longer than width at base, carinae definite; elytra semihyaline, almost twice as long as wide, apices rounded, veins raised with few long hairs.

Color: General color stramineous to cinereous, dorsum of abdomen more or less longitudinally lineate with darker.

Genitalia: In lateral view pygofer more or less rectangular, widest on venter; anal segment with pair of sharp processes; aedeagus widest at base, gently narrowed and strongly curved ventrally to sharp apex, avicephaliform; aedeagal brace narrow extending above level of edges of pygofers; styles more or less pediform, base strongly arcuate.

Holotype ♂, allotype ♀, 63 ♂ and 46 ♀ paratypes, Covington, La., Mar. 3, 1947, R. H. Beamer; other paratypes: 45 ♂♂ and 18 ♀♀, Slidell, La., Mar. 3, 1947, R. H. Beamer; 2 ♂♂, Pearlington, Miss., Mar. 3, 1947, R. H. Beamer; 14 ♂♂ and 8 ♀♀, Ocean Springs, Miss., Mar. 3, 1947, R. H. Beamer;

3 ♂♂ and 2 ♀♀, same place and date, L. D. Beamer; 31 ♂♂ and 9 ♀♀, Mariana, Fla., Mar. 7, 1947, R. H. Beamer; 18 ♂♂ and 8 ♀♀, same place and date, L. D. Beamer; 1 pair, Sanford, Fla., July 22, 1926, E. D. Ball.

Types and paratypes in Snow Entomological Collections; paratypes in United States National Museum.

34. Delphacodes turgida n. sp.

Brachypterous Form:

Resembles **Delphacodes sagae** Beamer but females, crown, pronotum and scutellum of males stramineous instead of fumous, and dorsal margin of aedeagus greatly swollen near middle. Length ♂ 3.0 mm.; ♀ 4.0 mm.

Structure: First antennal segment twice as long as wide; front a little more than twice as long as wide, widest near apical third, narrowed toward each end, more so toward base, distinctly tricarinate; crown about one-third longer than wide, carinae visible; elytra of male not reaching genital capsule, opaque, apices rounded, veins raised, female with elytra, exposing last three abdominal segments, apices rounded, veins heavier.

Color: General color stramineous; in male elytra, spot above hind coxae, more than half of abdomen and all of genital capsule except dorsum dark brown to black; female with spot above hind coxae and some longitudinal lines on abdomen more or less slightly darkened.

Genitalia: In lateral view, pygofer somewhat extended on caudo-dorsal corner; anal segment with a pair of long, sharp, processes extending almost directly away from segment; aedeagus narrowest at base, curved ventrally throughout, greatly swollen on dorsal margin at middle with four sharp retrorse teeth on dorsal margins between swelling and apex; aedeagal brace visible, large, more or less rectangular in shape, with outer half of ventral margin, more or less serrate; styles narrowed on outer third to sharp apices, a large tooth on this margin at outer third; in caudal view styles almost straight, narrowed on outer margin on apical third; aedeagal brace about twice as wide at base as at apex, extended dorsally more than half length of styles, apex bifid with a retrorse tooth, about as long as half width of brace at apex on either side just before tip.

Holotype ♂, allotype ♀, 10♂♂ paratypes, Yankeetown, Fla., Mar. 9, 1947, R. H. Beamer; other paratypes: 4♂♂, same place and time, L. D. Beamer; 10♂♂ and 9♀♀, Melbourne, Fla., Mar. 17, 1947, R. H. Beamer; 2♂♂, Woodville, Fla., Mar. 7, 1947, R. H. Beamer; 2♂♂, Mims, Fla., Mar. 18, 1947, R. H. Beamer; 5♂♂ and 2♀♀, Palatka, Fla., Mar. 10, 1947, R. H. Beamer; 1 ♂, Okefenokee Swamp, Ga., Billy's Island, July 27, 1939, R. H. Beamer; 1♂, Sanford, Fla., Aug. 16, 1926, E. D. Ball; 1♂, Sanford, Fla., Feb. 22, 1926, E. D. Ball; 2♂♂, Sanford, Fla., Nov. 23, 1926, E. D. Ball; 1♂ and 3♀♀, New Smyrna, Fla., Oct. 30, 1927.

Types and paratypes in Snow Entomological Collections; paratypes in United States National Museum.

35. Delphacodes adunca n. sp.

Brachypterous Form:

Resembling **Delphacodes andromeda** (V.D.) but general color of elytra and abdomen much lighter and first pair of processes on anal segment short

and sharp-pointed instead of very wide, long, and with rounded apices. Length ♂ 1.5 mm.; ♀ 2.0 mm.

Structure: First segment of antenna about as broad as long; front not quite twice as long as wide, widest at middle, apex very slightly wider than base, distinctly tricarinate; crown one third longer than basal width, wider at apex than at base, carinae distinct; elytra about as wide as long, hyaline with apices rounded.

Color: General color stramineous, in male, front, anterior half of pronotum and all of scutellum except apex, black; abdomen more or less tinged with dark on basal half; genital capsule black except a portion of dorsum; a spot above middle and hind coxae darker; female about as in male but darker portions not jet black.

Genitalia: In lateral view, pygofer more or less rectangular with outer dorsal and ventral corners rounded off making posterior margin much shorter than anterior; anal segment with two pairs of processes, the first pair short and sharp, length about equal to basal width, second pair almost as long as aedeagus bent back dorsally near middle to almost touch first pair; aedeagus slightly wider at apex than at middle, bent dorsally near base, then ventrally near outer third, outer half with numerous teeth well scattered over surface; aedeagal brace not visible in lateral view; styles with rather enlarged, more or less, serrated heels, sides slightly tapered to rounded apices with well marked angular hump on outer margins before apices; in caudal view, aedeagal brace extended dorsally about basal width, tip rounded; styles rather pediform on outer third, heel rather prominent on inner margins.

Holotype ♂, allotype ♀, 102♂♂ and 103♀♀ paratypes, Otter Creek, Fla., Mar. 9, 1947, R. H. Beamer; other paratypes: 3 ♂♂ and 3 ♀♀, same place and date, L. D. Beamer; 4♂♂, Raleigh, N. C., Oct. 16, 1938, P. W. Oman; 2♂♂, Hilliard, Fla., Oct. 5, 1938, P. W. Oman; 5♂♂, LaBelle, Fla., July 16, 1939, P. W. Oman; 8 ♂♂, Zolpho Springs, Fla., July 15, 1939; P. W. Oman; 4♂♂, New Port Ritchey, Fla., Oct. 7, 1938, P. W. Oman; 1♂, Sanford, Fla., Oct. 31, 1925, E. D. Ball.

Types and paratypes in Snow Entomological Collections and paratypes in United States National Museum.

36. **Delphacodes bifida** n. sp.

Brachypterous Form:

Resembles **Delphacodes campestris** (V.D.) but larger, male pronotum with dark spot back of each eye, elytra barely reaching genital capsule and anal segment with a pair of long processes. Length ♂ 2.8 mm.; ♀ 3.0 mm.

Structure: First segment of antennae twice as long as wide; front a little more than twice as long as wide, widest near basal third, narrowing toward either end, more so toward base, distinctly tricarinate; crown about as wide as long, carinae distinct; elytra reaching genital capsule, about twice as long as wide, semihyaline, veins raised and apices rounded.

Color: General color stramineous; front darkened between carinae in some specimens; pronotum with a brown spot back of each eye; scutellum

brown outside of lateral carinae; dorsum of abdomen mostly dark brown, lighter on basal segment and on genital capsule; darker spot above middle and hind coxae and below eyes; venter of abdomen of both sexes more or less embrowned.

Genitalia: In lateral view, pygofer more or less rectangular, wider on dorsal half than on ventral; anal segment with a pair of long, sharp processes extending more than their own width away from segment; aedeagus almost as broad as long, bifid almost half length; aedeagal brace long, triangular in shape; styles pediform in shape, heel sharp, toe narrow; in caudal view, aedeagal brace not extending dorsally; styles very small with heavy triangular bases and apices to narrowed and extended caudo-laterally.

Holotype ♂, Flagstaff, Ariz., Aug. 5, 1933, R. H. Beamer; allotype ♀, 2 ♂ and 5 ♀ paratypes, Santa Catalina Mts., Ariz., July 15, 1933; E. D. Ball; other paratypes: 2 ♂ ♂, Santa Catalina Mts., Ariz., June 29, 1933, E. D. Ball, 3 ♂ ♂, one long-winged, Santa Catalina Mts., Ariz., E. D. Ball; 3 ♂ and 3 ♀ ♀, Santa Catalina Mts., Ariz., June 29, 1933, E. D. Ball; 1 ♂, Chiricahua Mts., Ariz., July 18, 1934, E. D. Ball. There is also present 1 ♂ from Colorado and 1 ♂ from New York which seem to be this species but are not included in the type series.

Holotype and paratypes in Snow Entomological Collections; allotype and paratypes in United States National Museum.

37. **Delphacodes apicata** n. sp.

Brachypterous Form:

Resembling **Delphacodes campestris** (V.D.) but males without dark spot on sides of scutellum, styles pointed, and anal segment with a pair of processes. Length ♂ 2 mm.; ♀ 2.3 mm.

Structure: First segment of antennae slightly longer than wide; front less than twice as long as wide, widest near middle, narrowed toward each end, slightly narrower at apex, distinctly tricarinate; crown about as wide as long, carinae not distinct; elytra scarcely reaching middle of abdomen, semihyaline, veins raised, apices more or less truncate, shortest on inner margin.

Color: General color stramineous; male with abdomen mostly brown with a semblance of a median longitudinal light line and of a dark spot above middle and hind coxae; female much lighter with only a suggestion of darker spots on dorsum of abdomen.

Genitalia: In lateral view, pygofer much narrower on dorsal margin than ventral; anal segment with a pair of long sharp processes extended away from segment; aedeagus with broad base, narrowed to one third basal width near base, almost straight to apex with numerous spines on outer half; aedeagal brace almost as long and broad as length of aedeagus with posterior margin finely serrate; styles short, curved dorsally, narrowed on outer third to sharp apices; in caudal view, aedeagal brace slightly extended dorsally and greatly arched caudally; styles sinuate, narrowed greatly on outer third.

Holotype ♂, allotype ♀, 2 ♂ and 1 ♀ paratypes, San Francisco Mt., Ariz., Aug. 12, 1929, E. D. Ball; 1 ♂ paratype, same place and collector, Oct. 3, 1934.

Macropterous Form:

Like the brachypterous form except wings about one third longer than abdomen and general color darker which includes an embrowned scutellum except apex.

Holomorphotype ♂, Grand Canyon, Ariz., Aug. 11, 1927, R. H. Beamer; allomorphotype ♀, 3 ♂ and 2 ♀ paramorphotypes, San Francisco Mt., Ariz., Aug. 12, 1929, E. D. Ball; 2 ♂ paramorphotypes, Flagstaff, Ariz., Aug. 7, 1929, E. D. Ball.

Types and paratypes in Snow Entomological Collections and United States National Museum.

38. **Delphacodes arcanastyla** n. sp.

Brachypterous Form:

Resembles **Delphacodes bifida** Emr. but in lateral view male with a pediform-shaped aedeagus, aedeagal brace not visible and styles not pediform. Length 2.5 mm.

Structure: First segment of antennae not quite twice as long as wide, widest about the middle, slightly narrowed toward each end, strongly tricarinate; crown about as long as wide, carinae definite; elytra reaching to genital capsule, semihyaline, apices rounded.

Color: General color stramineous; coxae, large spot above each coxae, genae, area between carinae of front, anterior two thirds of pronotum outside lateral carinae, scutellum outside lateral carinae, and most of abdomen dark brown.

Genitalia: In lateral view, pygofer nearly circular, strongly narrowed on ventral margin; anal segment with a pair of strong, rather blunt, processes extending away from segment; aedeagus not quite as broad at base as length, strongly pediform on outer half, heel and region basad thickly set with minute teeth; aedeagal brace and styles not visible in this view; in caudal view, styles long, diverging, sides sinuate, narrowed on outer third; aedeagal brace not extended dorsally nor caudally.

Holotype ♂, Hell's Crossing, Wash., July 6-7, 1935, R. H. Beamer.

Macropterous Form:

Like the brachypterous form except elytra about one third longer than abdomen and general color darker, especially the scutellum which is entirely black.

Holomorphotype ♂, Midland Co., Mich., May 26, 1945, R. R. Dreisbach allomorphotype ♀, Paleer Co., Mich., June 2, 1945, R. R. Dreisbach; 2 ♂ paramorphotypes, Amery, Wis., June 10, 1917, E. D. Ball.

Types in Snow Entomological Collections, paramorphotypes in United States National Museum.

39. **Delphacodes paransera** n. sp.

Brachypterous Form:

Resembles **Delphacodes arcanastyla** but in lateral view aedeagus many

times as long as wide, not pediform; aedeagal brace visible, long and almost parallel-sided; styles enlarged at apex. Length ♂ 3 mm.

Structure: First antennal segment a little longer than wide; front a little more than twice as long as wide, sides almost parallel, slightly narrowed at either end, distinctly tricarinate on apical two thirds; crown about as wide as long, carinae indefinite; elytra semihyaline, veins raised, reaching to next to the last abdominal segment, apices rounded.

Color: General color stramineous, large spot above middle and hind coxae, genae, spot on pronotum back of each eye, sides of scutellum at least and sometimes all of scutellum and most of abdomen dark brown; arc of front between carinae sometimes slightly darkened.

Genitalia: In lateral view, pygofer more or less rectangular, ventral margin curved, a tooth on caudal margin near ventral corner, dorsal margin about half as long as ventral; anal segment with a pair of sharp processes extending away from segment; aedeagus long and slender, sides almost parallel, slightly enlarged near apex on dorsal margin, slightly curved ventrally on outer third, many teeth on outer half; aedeagal brace greatly extended caudally, rectangular in shape, covered with many teeth; styles sinuate, avicephaliform at apices; in caudal view, slightly projected dorsally, broad and feebly bifid; styles slender, enlarged into avicephaliform apices with beak on inner margin.

Holotype ♂ and 1 ♂ paratype, Piedmont, South Dakota, July 17, 1937, R. H. Beamer; other paratypes: 3 ♂♂, Sturgis, South Dakota, July 21-25, 1947, H. C. Severin; 2 ♂♂, The Plains, Wanakena, N. Y., Aug. 3, 1920, C. J. Drake.

Type and paratypes in Snow Entomological Collections, paratypes in United States National Museum and collection of H. C. Severin, North Dakota State College.

40. **Delphacodes dentis** n. sp

Macropterous Form:

Resembling **Delphacodes puella** (V. D.) but pronotum without the white hind border and male anal segment with two pairs of processes instead of one. Length ♂ 3 mm.; ♀ 3.2 mm.

Structure: First segment of antennae twice as long as wide; front slightly more than twice as long as wide, widest near apical third, narrowed toward each end, base narrower than apex, definitely tricarinate, median carina forking before apex of crown; crown as wide as long, carinae distinct; elytra about one third longer than abdomen, semihyaline, veins darker.

Color: General color stramineous; venter of sternum more or less black, genae, area between frontal carinae, spot back of each eye, area of scutellum outside lateral carinae of scutellum and sometimes entire scutellum except apex, and almost entire abdomen dark brown to black.

Genitalia: In lateral view, pygofer more or less trapezoidal with a small tooth near dorsal third of caudal margin; anal segment with two pairs of processes, first pair very short and heavy, second pair many times longer

than wide; aedeagus widest at base, dorsal margin sinuate, two short teeth near middle of outer third; aedeagal brace visible, oval in outline; styles widest at base narrower near middle, slightly enlarged into more or less bifid apices. In caudal view, aedeagal brace narrow, extended dorsally about its own width, slightly excavated; styles widest at base, strongly constricted just beyond middle, enlarged at apices, slightly bifid.

Holotype ♂, allotype ♀, and 1 ♀ paratype, Brownsville, Texas, Dec. 27, 1945, R. H. Beamer; other paratypes: 1 ♂, Sinton, Texas, Dec. 25, 1945, R. H. Beamer; 3 ♂♂ and 4 ♀♀, McAllen, Texas, Dec. 30, 1945, R. H. Beamer.

Types in Snow Entomological Collections.

41. **Delphacodes dentipennis**, n. sp

Brachypterous Form:

Resembles **Delphacodes livida** Beamer, but wings hyaline, extending to end of abdomen and pygofer of male in lateral view with a large tooth near middle of caudal margin. Length ♂ 2.2 mm.

Structure: First antennal segment about twice as long as wide; front about twice as long as wide, widest near middle, very slightly narrowed toward each end, slightly more so toward base, distinctly tricarinate; crown slightly longer than wide, widest at apex, carinae fairly distinct; elytra extending to tip of abdomen, hyaline, veins thickened.

Color: General color dark; legs, antennae, ventral margins of pronotum, tip of scutellum, basal segment of abdomen, and anal tube stramineous.

Genitalia: In lateral view, pygofer slightly wider than long, longest near middle with a large tooth near middle of caudal margin; anal segment very large with a pair of very long, heavy, processes; aedeagus bent ventrally near base about twice as wide near outer third as near base, narrowed at apex, dorsal third of outer half covered with teeth, the basal ones quite large; aedeagal brace not visible; styles more or less pediform, heel and toe sharp; in caudal view, aedeagal brace not extended dorsally, very broad; styles widest at base narrowed to apices with sharp tooth on inner margin near basal fourth.

Holotype ♂ and 8 ♂ paratypes in Mountain Lake, Va., Sept. 2, 1946, R. H. Beamer; other paratypes: 3 ♂♂, Storrs, Conn., Aug. 10, 1946, R. H. Beamer; 1 ♂, Colchester, Conn., Aug. 10, 1946, R. H. Beamer; 1 ♂, Rhinelander, Wis., July 15, 1917, E. D. Ball.

Types and paratypes in Snow Entomological Collections, paratypes in the United States National Museum.

42. **Delphacodes atralabis** n. sp.

Brachypterous Form:

Resembling **Delphacodes campestris** (V. D.) but male lacking dark spot on each side of scutellum and styles in caudal view narrowed on outer two-thirds. Length ♂ 2.2 mm.

Structure: First antennal segment about as long as wide; front about twice as long as wide, widest near middle, narrowed toward each end, more so toward apex, distinctly tricarinate; crown longer than wide, wider at apex than at base, carinae distinct; elytra semihyaline, extending slightly beyond middle of abdomen, apices rounded.

Color: General color stramineous with a large spot above middle coxae and styles black or dark brown; abdomen reddish yellow.

Genitalia: In lateral view, pygofer more or less rectangular, wider than long; anal segment without processes; aedeagus widest at base, narrowed on basal third to about one-third basal width, outer two-thirds evenly curved ventrally, with short tooth at apex on dorsal margin and four teeth near middle of outer third, aedeagal brace, large, triangular, apex sharp, bent somewhat ventrally; styles widest at base, narrowed to widen again just before more or less bifid apex; in caudal view, aedeagal brace not extended dorsally; styles widest at base, sharply narrowed at basal third, outer two-thirds with sides almost parallel, with small tooth on inner margin just before rounded apices.

Holotype ♂, Durham, New Hampshire, Aug. 12, 1946, L. D. Beamer; 2 ♂♂ paratypes same place and date, R. H. Beamer.

Macropterous Form:

Like the brachypterous form except the elytra about one-third longer than abdomen, widest at region of crossveins.

Holomorphotype ♂, Durham, New Hampshire, Aug. 12, 1946, R. H. Beamer.

Types in Snow Entomological Collections.

43. **Delphacodes arcuata** n. sp.

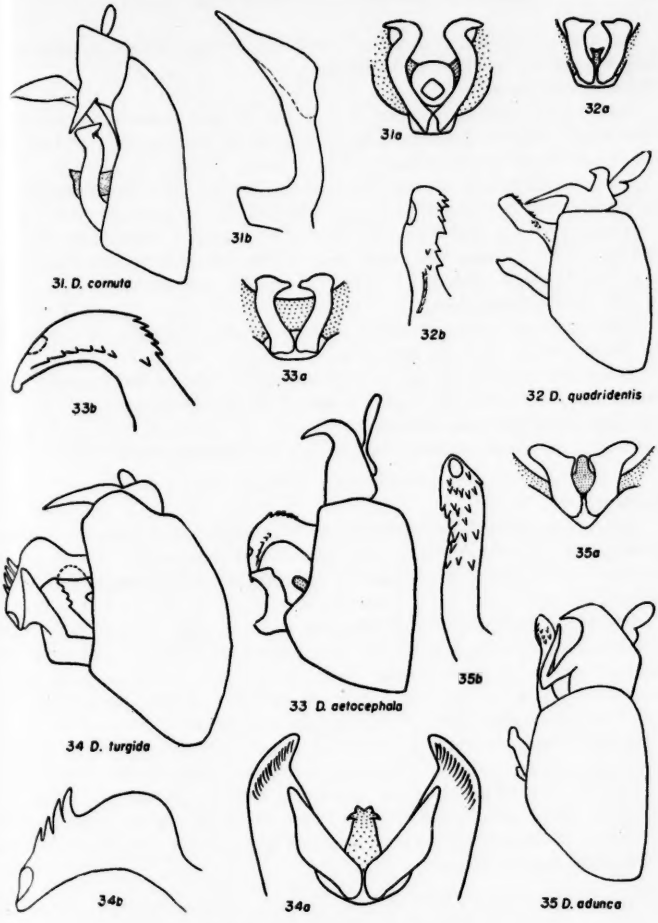
Brachypterous Form:

Resembling **Delphacodes quadrispinosa** M. and G. but males with posterior half of pronotum white instead of black and anal segment without processes instead of four. Length ♂ 2 mm.; ♀ 2.3 mm.

Structure: First segment of antennae about twice as long as wide; front slightly more than twice as long as wide, widest on apical third, slightly narrowed to apex, more so toward base, definitely tricarinate; crown longer than width at base, definitely carinate; elytra about twice as long as wide, reaching genital capsule, apices rounded, veins raised with raised spots fairly numerous.

Color: General color stramineous, male coxae and above, genae, clypellus, area between carinae of front and crown, small areas back of eyes, most of elytra except apical margin and spot on mesal margin before apex of clavus, most of dorsum of abdomen except basal segment, middle of last segment and anal segment and most of middle portions of ventral segments quite dark brown; females much the same but often generally much lighter.

Genitalia: In lateral view, pygofer more or less rectangular, widest on ventral margin, dorso-caudal corner slightly extended; anal segment without processes as such but outer dorsal corner extended slightly and outer ventral corner roundingly extended; aedeagus long, generally curved dorsally, shaft slightly narrowed just before two sharp teeth on dorsal margin near outer fourth; another sharp spine on left side about opposite these; aedeagal brace not visible; styles widest on basal half, narrowed and more or less avicephaliform on apices; in caudal view, aedeagal brace extended dorsally in a more or less triangular tooth; styles broadest at base with avicephaliform apices.



EXPLANATION OF PLATE VII

31. Lateral view of genital capsule of male of **Delphacodes cornuta** Beamer.
31a. Caudal view of styles and aedeagal brace of **Delphacodes cornuta** Beamer.
31b. Lateral view of aedeagus enlarged of **Delphacodes cornuta** Beamer.
32. Lateral view of genital capsule of male of **Delphacodes quadridentis** Beamer.
32a. Caudal view of styles and aedeagal brace of **Delphacodes quadridentis** Beamer.
32b. Lateral view of aedeagus enlarged of **Delphacodes quadridentis** Beamer.
33. Lateral view of genital capsule of male of **Delphacodes aetocephala** Beamer.
33a. Caudal view of styles and aedeagal brace of **Delphacodes aetocephala** Beamer.
33b. Lateral view of aedeagus enlarged of **Delphacodes aetocephala** Beamer.
34. Lateral view of genital capsule of male of **Delphacodes turgida** Beamer.
34a. Caudal view of styles and aedeagal brace of **Delphacodes turgida** Beamer.
34b. Lateral view of aedeagus enlarged of **Delphacodes turgida** Beamer.
35. Lateral view of genital capsule of male of **Delphacodes adunca** Beamer.
35a. Caudal view of styles and aedeagal brace of **Delphacodes adunca** Beamer.
35b. Lateral view of aedeagus enlarged of **Delphacodes adunca** Beamer.

Holotype ♂, allotype ♀, 35 ♂ and 21 ♀ paratypes, Lower Matacumba Key, Fla., March 14, 1947, R. H. Beamer.

Macropterous Form:

Like the brachypterous form except the wings extend about one-third their length beyond abdomen and color in elytra more spotty. A long spot at apex of clavus much darker in both forms.

Holomorphotype ♂, allomorphotype ♀, 13 ♂ and 30 ♀ paramorphotypes, Lower Matacumba Key, Fla., March 14, 1947, R. H. Beamer; other paramorphotypes: 4 ♂ ♂ and 9 ♀ ♀, Ft. Pierce, Fla., Aug. 7, 1930, R. H. Beamer; 14 ♂ ♂ and 2 ♀ ♀, same place and date, P. W. Oman; 2 ♀ ♀, Sebring, Fla., Aug. 5, 1930, P. W. Oman; 1 ♂, Haw Creek, Fla.; 1 ♀, Ft. Myers, Fla., Aug. 14, 1930, J. O. Nottingham.

Types and paratypes in Snow Entomological Collections. Paratypes in the United States National Museum.

This is the species described by Muir and Giffard as **Delphacodes albonotata** (Crawf.), Bull. Hawaiian Sugar Planters Association, p. 36, 1924. The type of **Delphacodes albonotata** (Crawf.) No. 15988 in the United States National Museum is a brachypterous ♂ of **Perigrinus mardis** Ashm.

44. **Delphacodes aculeata** n. sp.

Brachypterous Form:

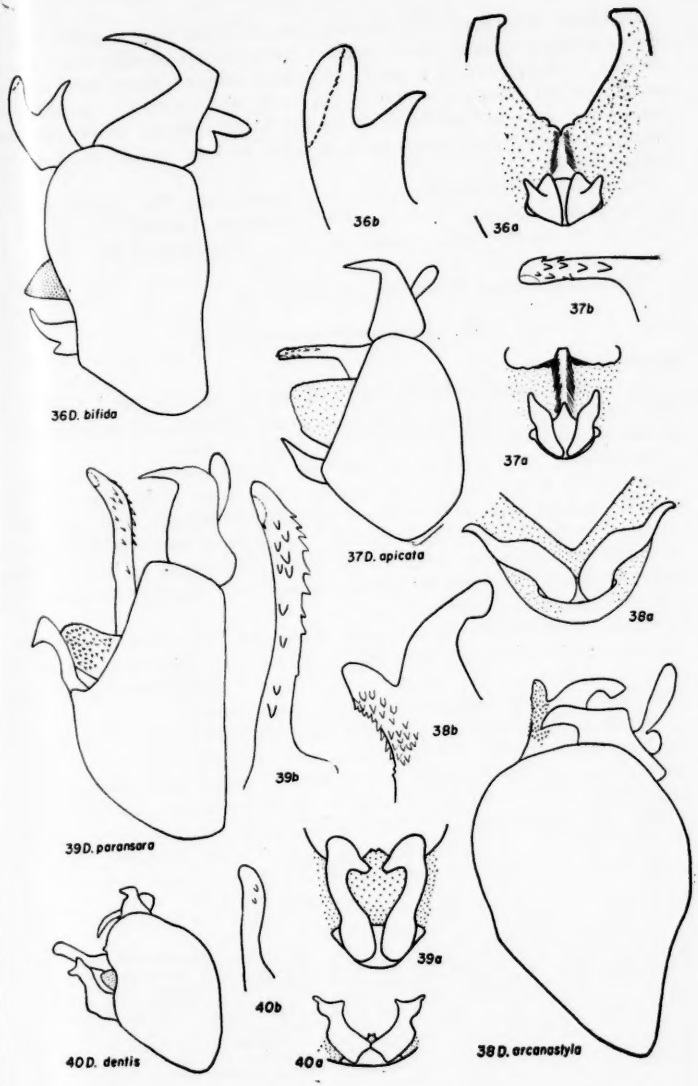
Resembling **Delphacodes penepuella** Beamer but first antennal segment about color of second segment (not black as in **D. penepuella**); elytra usually embrowned on most of the outer third; pygofer of male flaring and aedeagus straight. Length ♂ 1.7 mm.; ♀ 2 mm.

Structure: First segment of antennae about as wide as long; front about twice as long as wide, widest near apical third, narrowed toward each end, more so toward base, distinctly tricarinate; crown about one half longer than basal width, anterior fovea more or less open at base, carinae definite; elytra barely reaching genital capsule, apices rounded.

Color: General color dark; legs and antenna stramineous, first segment of antennae about same color as second, carinae of front and crown, posterior half of pronotum, tip of scutellum, most of clavus and margin of apices of elytra almost white, darker spot at tip of clavus, basal segment of dorsum of abdomen yellowish, margins of segments and lateral margins of abdomen usually lighter.

EXPLANATION OF PLATE VIII

36. Lateral view of genital capsule of male of **Delphacodes bifida** Beamer.
36a. Caudal view of styles and aedeagal brace of **Delphacodes bifida** Beamer.
36b. Lateral view of aedeagus enlarged of **Delphacodes bifida** Beamer.
37. Lateral view of genital capsule of male of **Delphacodes apicata** Beamer.
37a. Caudal view of styles and aedeagal brace of **Delphacodes apicata** Beamer.
37b. Lateral view of aedeagus enlarged of **Delphacodes apicata** Beamer.
38. Lateral view of genital capsule of male of **Delphacodes arcanastyla** Beamer.
38a. Caudal view of styles and aedeagal brace of **Delphacodes arcanastyla** Beamer.
38b. Lateral view of aedeagus enlarged of **Delphacodes arcanastyla** Beamer.
39. Lateral view of genital capsule of male of **Delphacodes paransara** Beamer.
39a. Caudal view of styles and aedeagal brace of **Delphacodes paransara** Beamer.
39b. Lateral view of aedeagus enlarged of **Delphacodes paransara** Beamer.
40. Lateral view of genital capsule of male of **Delphacodes dentis** Beamer.
40a. Caudal view of styles and aedeagal brace of **Delphacodes dentis** Beamer.
40b. Lateral view of aedeagus enlarged of **Delphacodes dentis** Beamer.


36D. bifida
36b
36a
37b
37a
37D. apicata
38a
38b
39b
39D. paransara
39a
40b
40a
40D. dentis
38D. arcanastyla

Genitalia: In lateral view, pygofer semi-circular; anal segment with a pair of sharp processes, broad at base; aedeagus broadest at base, almost straight, narrowed evenly to apex, outer third evenly covered with retrorse teeth; aedeagal brace not visible in this view; styles more or less pediform, heels very large and rounded; in caudal view, aedeagal brace extended slightly dorsally, often bifid; styles broadest at base, apices more or less avicephaliform.

Holotype ♂, 6♂ and 1♀ paratypes, Otter Creek, Fla., March 9, 1947, R. H. Beamer; allotype ♀, 5♂ and 6♀ paratypes, Lamont, Fla., March 7, 1947, R. H. Beamer; other paratypes: 4♂♂, Yankeetown, Fla., March 9, 1947, L. D. Beamer.

Types in the Snow Entomological Collections.

45. **Delphacodes truncata** n. sp.

Brachypterous Form:

Resembling **Delphacodes waldeni** (Metcf.) but slightly smaller, veins of elytra not so brown, tips of elytra more nearly truncate and aedeagus with dorsal margin undulating. Length ♂ 2.3 mm.; ♀ 2.8 mm.

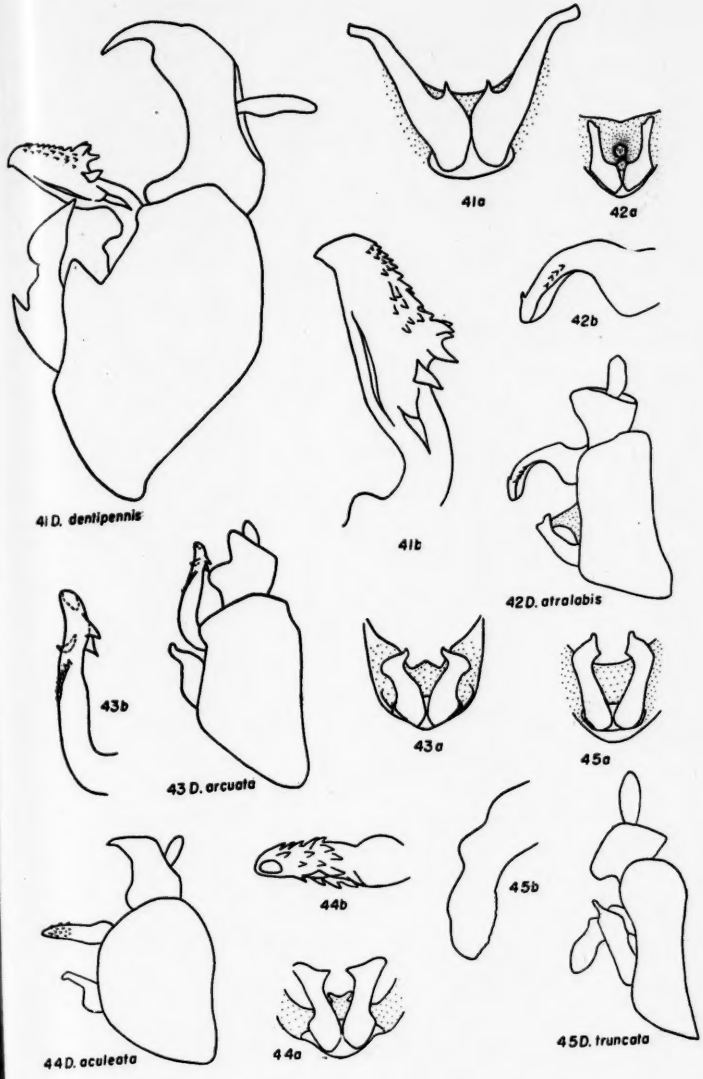
Structure: First segment of antennae about twice as long as wide; front slightly less than twice as long as wide, widest at middle, narrowed toward each end, more so toward base, distinctly tricarinate; crown definitely longer than basal width, apex rounded, wider than base, carinae definite on base, less distinct at apex; elytra semihyaline, about as long as wide, apices truncate, veins raised; genital capsule very narrow, retracted into abdomen, practically flush with surface.

Color: General color stramineous, coxae and spot above often darker, veins of elytra slightly embrowned, semblance of longitudinal rows of spots on abdomen, darker dorsolateral margin of each abdominal segment, often with a red spot, pygofer with parts much darker.

Genitalia: In lateral view, pygofer very short, more than twice as wide as long; anal segment without processes in ordinary sense, outer ventral corner more or less enlarged as an aedeagal guide; aedeagus with sides undulating, curved ventrally throughout; aedeagal brace not visible, styles widest just before apex, outer margins almost straight, inner sinuate, sharply narrowed on outer fifth; in caudal view, aedeagal brace not extended dorsally; styles widest at base, turned in on outer fourth.

EXPLANATION OF PLATE IX

41. Lateral view of genital capsule of male of **Delphacodes dentipennis** Beamer.
41a. Caudal view of styles and aedeagal brace of **Delphacodes dentipennis** Beamer.
41b. Lateral view of aedeagus enlarged of **Delphacodes dentipennis** Beamer.
42. Lateral view of genital capsule of male of **Delphacodes atralabis** Beamer.
42a. Caudal view of styles and aedeagal brace of **Delphacodes atralabis** Beamer.
43. Lateral view of genital capsule of male of **Delphacodes arcuata** Beamer.
43a. Caudal view of styles and aedeagal brace of **Delphacodes arcuata** Beamer.
43b. Lateral view of aedeagus enlarged of **Delphacodes arcuata** Beamer.
44. Lateral view of genital capsule of male of **Delphacodes aculeata** Beamer.
44a. Caudal view of styles and aedeagal brace of **Delphacodes aculeata** Beamer.
44b. Lateral view of aedeagus enlarged of **Delphacodes aculeata** Beamer.
45. Lateral view of genital capsule of male of **Delphacodes truncata** Beamer.
45a. Caudal view of styles and aedeagal brace of **Delphacodes truncata** Beamer.
45b. Lateral view of aedeagus enlarged of **Delphacodes truncata** Beamer.


41a
42a
42b
41D. dentipennis
41b
42D. atralabis
43b
43a
45a
43D. arcuata
44b
45b
44D. aculeata
44a
45D. truncata

Holotype ♂, allotype ♀, 1♂ and 2♀ paratypes, Saucier, Miss., March 5, 1947, R. H. Beamer; other paratypes: 1♂, Ocean Springs, Miss., March 3, 1947, R. H. Beamer; 4♂♂ and 1♀, Ramsay, La., March 3, 1947, R. H. Beamer; 3♂♂ and 1♀, Sanford, Fla., March 11, 1947, R. H. Beamer; 3♀♀, same place and date, L. D. Beamer; 1♀, Otter Creek, Fla., March 3-9, 1947, R. H. Beamer; 2♂♂ and 1♀, Lamont, Fla., March 7, 1947, R. H. Beamer; 1♂, Mariana, Fla., March 7, 1947, R. H. Beamer; 1♀ and 1♂, Palatka, Fla., March 10, 1947, R. H. Beamer; 1♂, Mims, Fla., March 18, 1947, R. H. Beamer; 1♀, La Belle, Fla., March 13, 1947, R. H. Beamer; 8♂♂ and 2♀♀, Waycross, Ga., March 18, 1947, R. H. Beamer; 4♂♂, Cape Henry, Va., July 3, 1938, P. W. Oman; 1♀ Waycross, Ga., Oct. 5, 1938, P. W. Oman; 1♂, Eridu, Fla., July 11, 1939, P. W. Oman; 2♂♂, New Port Fitchey, Fla., Oct. 7, 1938, P. W. Oman; 1♂, Sanford, Fla., March 20, 1926, E. D. Ball.

Types and paratypes in Snow Entomological Collections; paratypes in United States National Museum.

Correction

On page 68 of the April issue of the **Journal** the figures for **M. bivittatus** and **M. mexicanus** under Gamma Benzene Hexachloride should be exchanged.

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